APRIL 21, 1952

Electrical World

Price 35 Cents

A McGRAW-HILL PUBLICATION

What they said at the

SALES CONFERENCE

Low-Cost 5/8% Step Regulator Line Distribution Extended

Time-tested JFR regulators can now be used on any feeder

THE EXTENSION of the Allis-Chalmers JFR 5/8% step voltage regulator line to cover five new ratings means that the initial cost of regulation has been reduced for many more feeders. Now you can get time-tested JFR's in the following ratings: 100 amps rated 7620 volts; 50 and 100 amps rated 5000 volts; and 100 and 200 amps rated 2500 volts.

The low price tag on Allis-Chalmers JFR 5/8% step regulator line means that the advantages of voltage regulation can now be brought to marginal lines where equipment costs were too high before. And even though the price tag is low, there's no reduction in quality with the JFR. You get all the advantages of Allis-Chalmers 5/8% step voltage regulation: 5/8% steps, ± 1 volt band, 20% range of regulation, close average voltage maintained by voltage integrator, life long contacts, tap changing and drive mechanism with balanced spring action to eliminate shock, and unit construction for easier maintenance.

Get the complete story on how the Allis-Chalmers JFR 5/8% step voltage regulator line can cut regulation costs for you. Call your nearest Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3740

RATINGS NOW AVAILABLE

7620 volts	5000 volts	2500 volts
15 amp	50 amp	100 amp
50 amp	100 amp	200 amp
100 amp		

ALLIS-CHALMERS

Originators of 5/8% Step Regulators

ELRAMA'S EXCITERS

Duquesne Light Co's newest station, Elrama, is now on the line. One of the unusual features of this plant is the use of a fly-wheel type, motor-driven exciter. G. B. Miller, Jr, formerly of Duquesne but now of Ebasco International Corp, will discuss this installation in great detail in the May 5 issue.

HIGHER RATES WITHOUT OPPOSITION

Raising rates often makes customers rather angry. But if the utility takes a scientific approach, customers may pay the higher charges without protest. The Taunton (Mass.) Municipal System figured out an ingenious plan that worked. It involved timing, method, and manner. Any utility executive or rate expert who will soon be asking the public to pay higher bills will find "We Put Our Rates into Line with Our Costs" interesting reading in a coming issue.

HOUSE HEATING AGAIN

Utilities which have been going serenely on their way confident that electric house heating is too expensive in cold climates may have a shock coming. Consolidated Edison Co in its Westchester Division has been checking on some electric panel heating installations. As might be expected, electric heating was about three times as costly as gas or oil.

But with improvement of heat insulation methods and practices, and for houses of very moderate size, it is conceivable that this load will reach significant proportions even in a relatively cold climate. Data secured in these tests will make "Con Edison Checks Up on Electric House Heating" must reading in the May 5 issue.

TWO NEW DEPARTMENTS

If you haven't noticed, Electrical World has added two new departments. The one, Industrial Relations, is a feature of the News or "little" book. The other, Public Relations & Advertising, runs in the News Section of the Engineering or "big" book. Suggestions for improving these two departments would be most welcome.

Electrical World

Published for 78 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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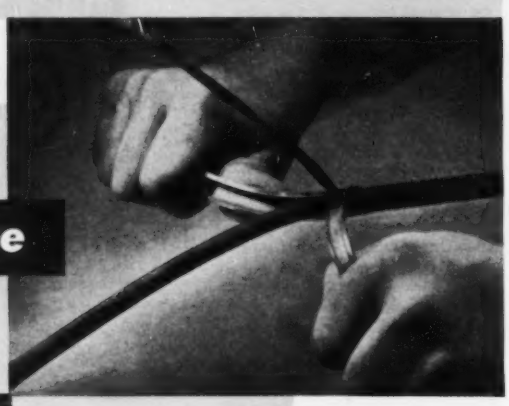
you can always tell HAZACORD



...by appearance

...by performance

the METAL MOLD CURE makes the difference

YOU can always tell HAZACORD—first, by appearance, and second, by performance. It's the metal mold cure that makes the difference... makes HAZACORD the best flexible cord you've ever used.

When the metal mold in which HAZACORDS are pressure vulcanized is stripped away, the name HAZACORD appears in raised letters on the sheath, as shown in the illustration. This embossing is your proof that every foot of HAZACORD is mold cured.

But it's in performance that you find the real difference. Mold curing makes the Hazaprene ZBF Sheath denser, smoother, and tough enough to take the worst kind of beating. Despite oil or grease, heat or flame, moisture, weather, abrasion or mechanical damage, HAZACORDS keep your portable power tools and equipment on the job at all times.

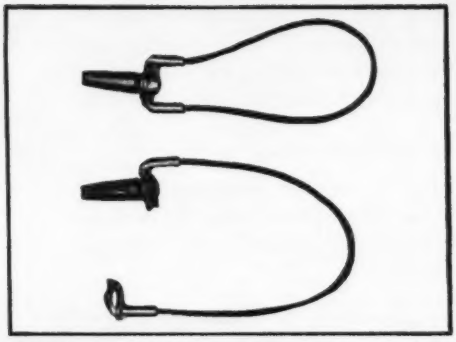
Inside this rugged mold-cured sheath are extra-flexible conductors, a carefully compounded rubber insulation, and strong fibrous laterals. The design, construction and materials of each component adds to the longer service life and superior performance of HAZACORDS.

But it's the metal mold cure that makes the big difference... that tips the balance between an average portable cord and high performance HAZACORDS. It's why production and maintenance men everywhere are saying HAZACORDS *last longer, perform better* and *save money*. Write for HAZACORD BULLETIN EW-444 Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD insulated wires and cables for every electrical use

Electroline AUTOMATIC DEAD-END

for Neutral Supported Multiple Conductor Service-Drop Cable



THE 4000 SERIES ANCHOR BRACKET

This Electroline Automatic Dead-End is designed for use with neutral-supported type of service drop. The insulation on the phase wires is not destroyed because these Dead-Ends grip only the bare neutral. This eliminates the possibility of shorting any phase. Available only for No. 6-AWG conductor. For automatic line Dead-Ends use the Electroline 3400 Series.

THE ELECTROLINE 3800 SERIES Automatic Dead-Ends lower construction costs because they are easily installed in a few seconds. This Dead-End is assembled as a one-piece unit with no loose parts to be dropped or lost. One end of the flexible bail is detachable for use with a spool-type insulator or other types of supporting anchorages now in service. This feature permits quick and easy installation with only one part, other than the conductor, to be handled by the lineman.

ELECTROLINE 4000 ANCHOR BRACKET — The 4000 Series Service Bracket, for use on permanently multi-grounded neutral systems (ideal for use with 3800 Series Dead-Ends as illustrated below), permits quick and simple insertion of a closed bail or loop—supports the cable at any angle. Installation costs are further reduced since this method of anchoring eliminates the insulator and insulator hardware.

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E
ABILITY TO PRODUCE

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In Canada: POWERLITE DEVICES, LTD., TORONTO

NOW!
Cut Engineering Time and Effort
In Group-Operated Switch Application
WITH "READY-MADE"
Standard Mounting Arrangements and . .

The high voltage switch user has been —in the past—subjected to a series of inconveniences when he has ordered a group-operated switch. Special erection drawings were required; there was usually a delay in preparing these drawings, in obtaining customer approval, and sometimes in manufacture while special operating parts were fabricated. To overcome these inconveniences, a series of "ready-made" Standard Mounting Arrangements, covering the majority of configurations used in line and station construction, have been developed for each group-operated Alduti Interrupter Switch.

What Standard Mounting Arrangements Mean to You

Switches may now be ordered immediately, and you can at once complete your line or station layout, since no "special" drawings are required to adapt the switches. Also shipping time is radically reduced, since there is no delay for engineering, or for customer approval.

Standard Mounting Arrangements Charted

To further simplify the engineering process a Selector Chart, shown on the facing page, pictures the available Standard Mounting Arrangements, each designated by an "ED" number. Each ED number on the Selector Chart identifies a printed standard erection drawing on which is given in detail, all the information needed to apply and install the selected switch together with its operating mechanism.

Thus you can have in your file — visually indexed by the Selector Chart — all of the engineering data needed to select, specify, and install any group-operated Alduti Interrupter Switch in a wide variety of arrangements to suit almost any mounting requirement.

Complete information, including the Selector Chart, is contained in this

NEW CATALOG SECTION 760

Write for your copy, or contact your S & C representative today.

S&C ELECTRIC COMPANY

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CHICAGO 40, ILLINOIS, U. S. A.

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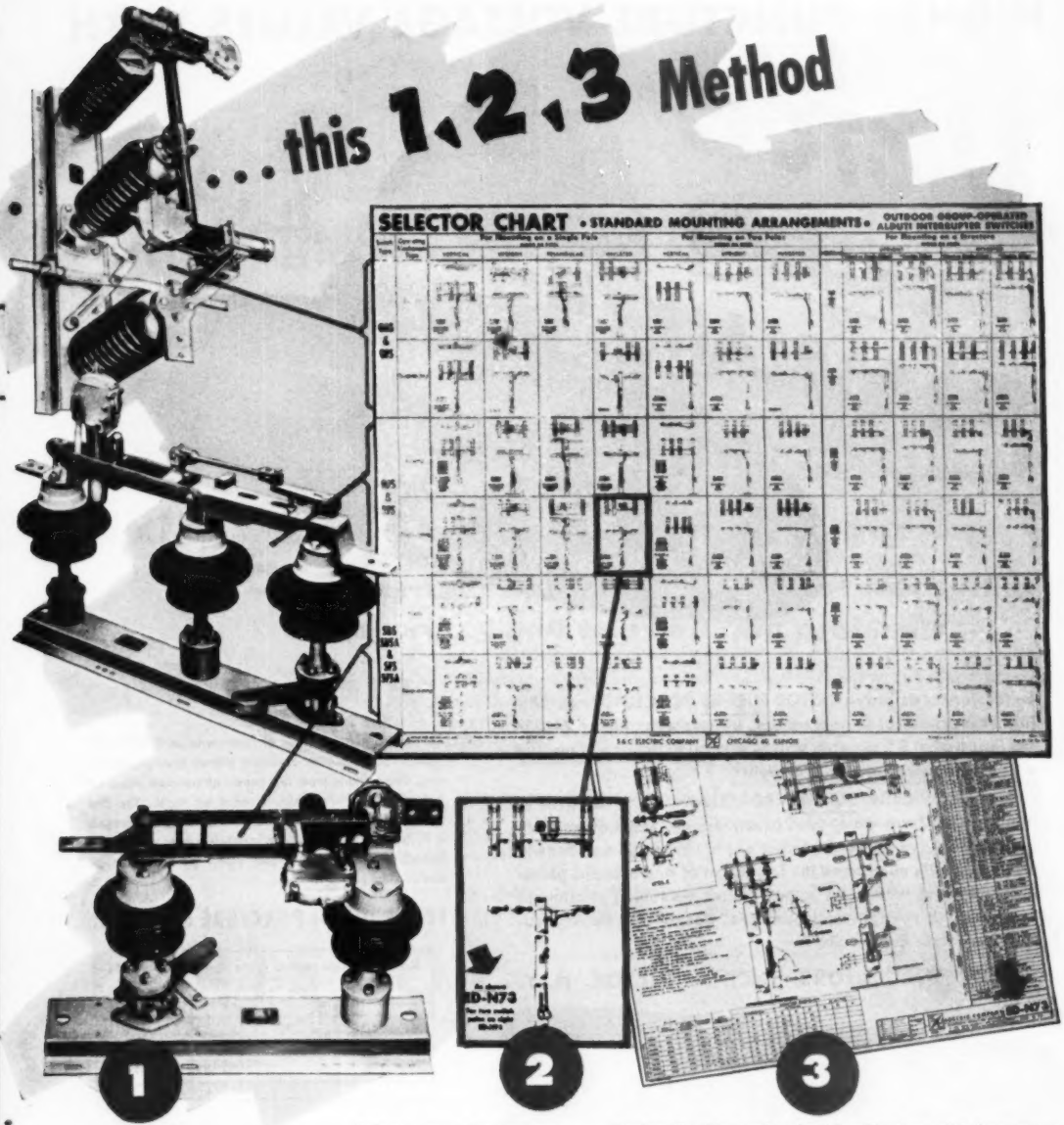
Formerly Schweitzer & Conrad, Inc.

. . . this 1, 2, 3 Method



Select the switch and specify by catalog number.

Select a mounting arrangement that fits your requirement, and specify by "ED" number.

Having the ED number for identification, pick from your file the erection drawing of the same number, or get it from your S & C representative. The erection drawing gives all the information needed to install the switch.

The ALDUTI INTERRUPTER SWITCH is a high voltage circuit interrupter for outdoor, indoor or metal-clad service providing a visible isolating air gap. In appearance, simplicity of construction, and mechanics of disconnecting it resembles the conventional air break switch. In scope of current interruption — fault currents excepted — and in behavior during current interruption it is similar to a circuit breaker. In the economics of application it stands alone.

It interrupts — without arcing — line and cable charging currents, capacitor charging currents, magnetizing currents, and load currents up to 600 amperes.

Filling the gap between air-break switches and circuit breakers, the interrupter switch is now used in a variety of utility and industrial applications — sectionalizing, transformer primaries, transformer secondaries, preferred-emergency throw-over, power centers, unit substations, bus transfer, and capacitor bank switching.

Moreover, the no-external-arc performance has permitted physical applications of the Alduti Interrupter Switch usually not practicable with conventional air switches, *i.e.*, vertically mounted, mounted on close phase spacings, and metal-clad.

HIGHER PUNCTURE VOLTAGE VALUES WITH

VICTOR PURIFIED PORCELAIN!

VICTOR NO. 900
SUSPENSION INSULATOR

Laboratory tests prove VICTOR *PURIFIED* PORCELAIN has 18% higher mechanical impact values, an improvement of 24% in the range of M & E strength values and oil puncture values that are remarkable (See charts at right!)

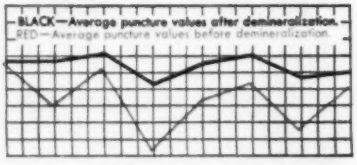
Secret of VICTOR *PURIFIED* PORCELAIN is the removal of mineral salts from water used in processing. Years of research in this field have reduced fluctuations in shrinkage and density and practically eliminated the formation of microscopic, glass-like impurities which, up to now, have prevented attainment of maximum strength and hardness. Result—the finest insulator porcelain ever made!

VICTOR INSULATORS, INC. • VICTOR, N. Y.

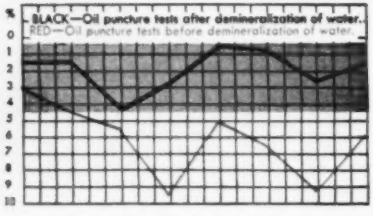
HERE'S PROOF!

Shown below are records of tests made on VICTOR 10" 15,000 lb. Suspension Insulators picked from production runs. These charts show test results of puncture under oil before and after demineralization of water. The first shows average puncture values of tests made and reveals a 7½% increase of average puncture values after water demineralization. The second shows percent average deviation of puncture values.

TEST RUNS OF PUNCTURE UNDER OIL

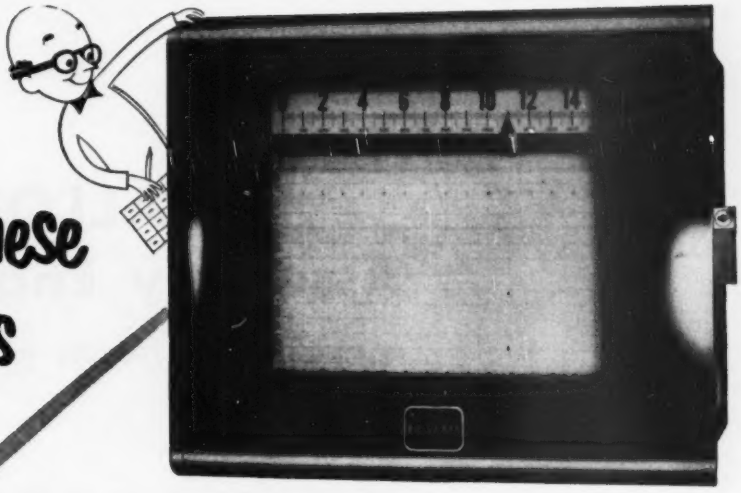


Average Puncture Values of Tests Run



Percent Average Deviation of Puncture Values

Specify VICTOR SUSPENSION INSULATORS



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—the electronic master-mind for your measuring, recording and telemetering problems

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- ✓ All types of electric and air-operated controllers offered
- ✓ Available as a self-balancing bridge or potentiometer
- ✓ Trouble-free operation
- ✓ Electronic component uses vacuum tubes available at any radio supply house
- ✓ Full-scale pen travel in 7, 3 or ⅔ seconds
- ✓ Chart speeds from ¼ in. per hour to 7200 in. per hour
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- ✓ Immune to most vibration or shock
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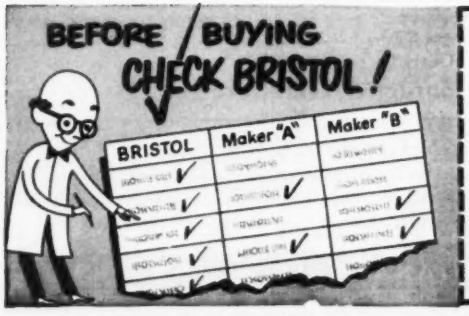

THE BRISTOL COMPANY
116 Bristol Road
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FROM DESIGN TO FINISHED ELECTRICAL CONTACT ASSEMBLY...

MALLORY Assembly Engineering

is qualified to handle all your problems

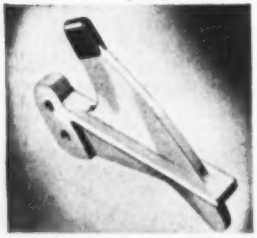
You save time, trouble and expense when you turn your electrical contact assembly problems over to Mallory.

From design and material selection . . . to parts fabrication and finishing . . . to final assembly, Mallory is qualified by its facilities, personnel and experience to handle the *whole* job for you.

Mallory takes pride in the design of more than 5000 different contacts . . . has developed many special alloys as well as new brazing and production techniques . . . has pioneered in the development and practical application of powder metallurgy . . . has designed and produced all kinds of switches.

When Mallory engineers work for you, you get better contact assembly performance . . . lowered costs . . . freedom from the problems of handling, scheduling and divided responsibility involved in assembling your own contact units.

EXPECT MORE . . . GET MORE FROM MALLORY



When overheating in a circuit breaker contact assembly caused premature failures, the problem was handed to Mallory assembly engineers.

They solved it through the use of a strong, copper-base Mallory alloy in the arcing blade . . . Mallory Elkonite® as the contact material . . . Mallory-developed brazing techniques. The assembly designed and produced by Mallory gave longer life . . . at a lower cost . . . and permitted the power rating of the circuit breaker to be *increased 100%*.

It is reasonable to expect that Mallory engineers can do for you what they have done for others. Call or write Mallory today.

In Canada, made and sold by Johnson Matthey & Mallory Ltd., 110 Industry St., Toronto 15, Ontario.

Electrical Contacts and Contact Assemblies

P R MALLORY & CO Inc

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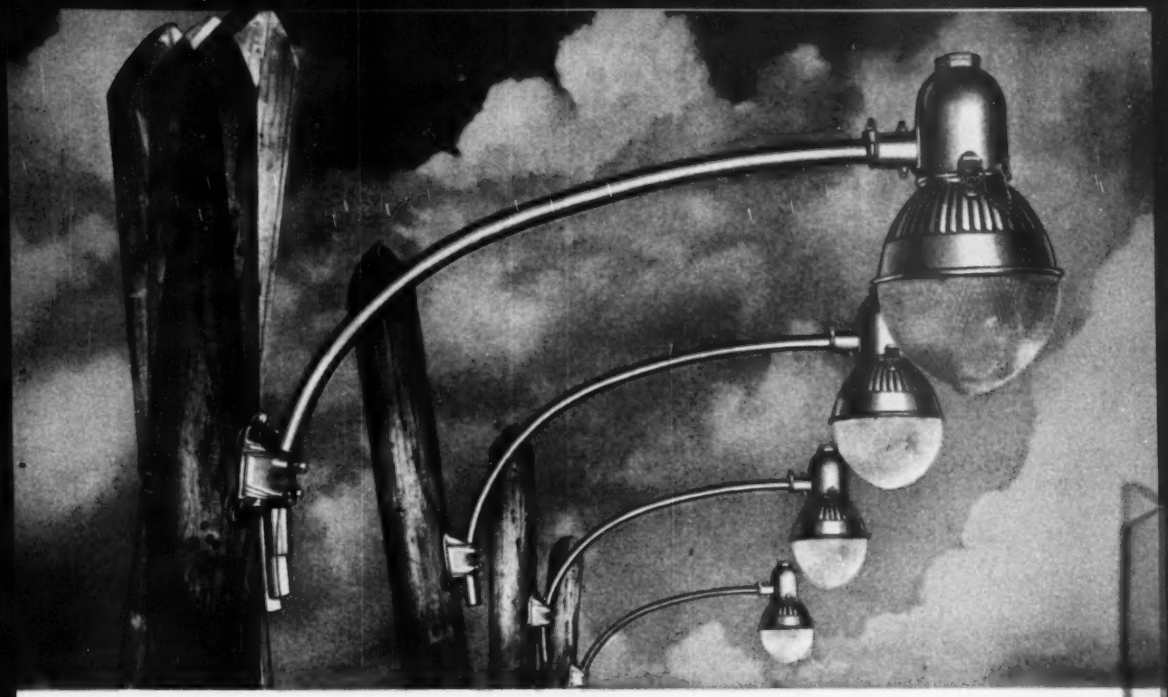

Luminaires Easier to Align With L-M's New Adjustable Bracket

Features integral plumbing for wide ranges of pole rake . . . clean, modern lines . . . easy installation and wiring . . . minimum pole-space requirement.

Really rigid: **the pole plate is a sturdy casting, either steel or aluminum, rigidly held to the pole with a machine bolt at the top and two lag screws below. Two U-bolts grip the bracket firmly. It requires a minimum of pole space.**

Here is a new single curve upsweep bracket that makes it easy for you to plumb the luminaire. The bracket has pleasing, functional design; it is made in either steel or aluminum; it is easy to install and wire; and it is available with all conventional end-fittings.

Easy to adjust: the curved pipe is clamped into the pole plate with two U-bolts. By moving the pipe up or down, you change the angle to compensate for almost any degree of pole rake. Then you tighten the U-bolts, and the bracket remains rigid in the desired position.

Easy to install: the pre-wired assembly is attached to the pole by means of an open-slotted pole plate, which fits over a single machine bolt at the top. The entire weight of the assembly is firmly held this way, while you install two lag screws at the bottom of the pole plate. This mounting requires a minimum of pole space.

Easy to wire: the one piece bracket is a single curve, with smooth contour. There are no sharp bends or extra units through which the wiring must be guided. You just slide the wire right through—it saves time and helps assure a good job. Ask the L-M Field Engineer for full information, or write Line Material Co., Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LM **LINE MATERIAL**
Street Lighting

84

THE INDUSTRY'S FIRST STANDARDIZED "FAMILY"

of 5 KV Cutouts with interchangeable doors!

50 and 100 ampere cutouts, each with

new PND standard duty non-indicating doors

PVD standard duty indicating doors

PHD heavy duty non-indicating doors

100 and 200 ampere switch blade doors

L-M, leading manufacturer of distribution cutouts, presents the first fuse cutout family offering complete interchangeability. 50 and 100 ampere boxes are offered, each taking care of four types of services.

Now—buy one box, with the doors you need for your present services. As operating requirements change, simply unhook the present door and hook on a new one. It's a 6-second job!

This new family saves space, time, and money in warehousing, installation, and operation. Safer, too! The lineman can remove the door completely, re-fuse, and replace it, all with the *switch stick*. When door is open, all door parts are dead.

Get the Whole Story. Ask the L-M Field Engineer; or write Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).

1. Standard duty non-indicating—interrupting capacity 1,200 amperes
2. Standard duty indicating—interrupting capacity 1,200 amperes
3. Heavy duty non-indicating—interrupting capacity 8,000 amperes
4. 100 ampere switch blade

50
ampere cutout with four interchangeable doors

L-M's New 5 kv "first family"

RATING	INTERCHANGEABLE DOORS AVAILABLE	INTERRUPTING CAPACITIES RMS AMPERES 2.5 kv	5 kv
50 AMPERES	1. "PND" standard duty, non-indicating	1,200 amperes	1,200 amperes
	2. "PVD" standard duty, indicating	1,200	1,200
	3. "PHD" heavy duty, non-indicating	8,000	5,000
	4. Switch Blade	100 amperes continuous current rating	
100 AMPERES	5. "PND" standard duty, non-indicating	3,000	3,000
	6. "PVD" standard duty, indicating	3,000	3,000
	7. "PHD" heavy duty, non-indicating	14,000	10,000
	8. Switch Blade	200 amperes continuous current rating	

"PVD," "PND," and "PHD" are L-M trademarks.

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LM

LINE MATERIAL

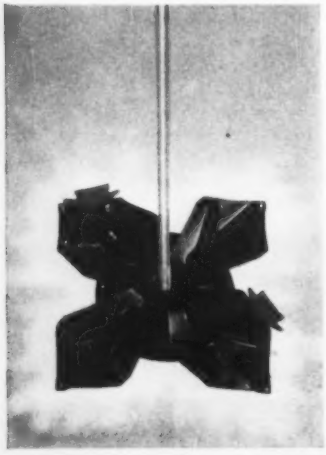
fuse cutouts

Complete Coordinated Equipment for Distribution Today

Also in 7.5 kv sizes

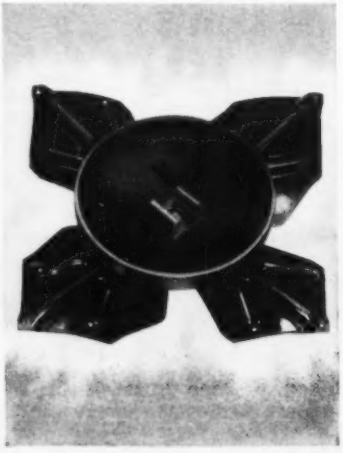
A 7.5 kv family is also available, with 50 and 100 ampere cutouts, each with four interchangeable doors. Doors can be bought separately.

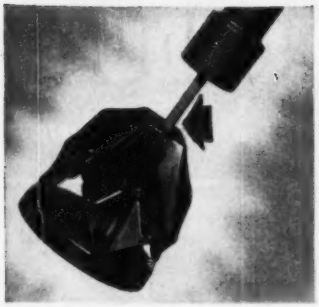
Two-piece design . . . The four blades are formed of a single piece of steel, and are held to the base plate by four small bolts, which simply shear off by tamping. The center hole is extruded downwards. This extrusion provides a bearing surface against the rod to prevent binding; it reinforces the tamping area; and it provides an audible signal when the extrusion strikes the base, indicating full expansion.



Top view . . . Notice the additional area inside the center of gravity of two opposed blades which gives utmost area for increased holding power, without sacrificing balance of the anchor.

Base plate . . . .Heavy steel, with skirted edge to prevent deformation. A nut retainer strap welded to the underside reinforces the hole so that the nut cannot pull through the base plate.





Anchor closed . . . Notice the large square tamping area, and the wide hinge sections which keep the blades from twisting if a stone is encountered while the anchor is being expanded.

Partly open . . . Arched, shovel-shaped blades slide into the earth with a minimum of soil disturbance. Heavy ribs on the underside decrease friction between blades and base plate.

Fully expanded . . . A large percentage of the expanded area is in undisturbed earth. Therefore load can be applied to the anchor immediately after installation, with little danger of creepage.

L-M's New 4-Way Pressed Steel Anchors Designed for Exceptional Strength

L-M has recently completed an extensive series of tests that reveal exceptional strength and holding power in the new 4-Way anchors.

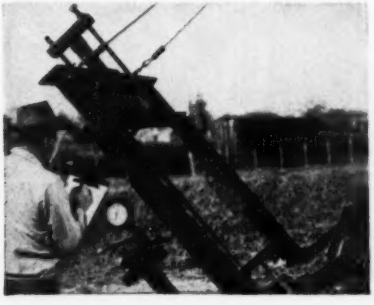
These anchors are easy to install. They have ample holding power above their nominal ratings. There is a generous safety factor in mechanical strength of all parts. And the cost is low!

The design offers many desirable features. A large square tamping area is well reinforced by the downward extrusion of the anchor rod hole, which also provides a bearing area against the rod. Arched, pointed blades slide into the earth without disturbing it, permitting application of the load right after installation. Heavy ribs reinforce the blades and reduce friction against the base plate during expansion. Nut retainer strap reinforces the base, and keeps the nut from pulling through. All three sizes are REA-accepted.

For details and samples ask the L-M Field Engineer; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

Available in Three Sizes

Catalog No.	20002681	20002682	20002683
Expanded Area, square inches	110	125	132
Nominal Holding Power Class, pounds	6000	8000	10,000
Diameter, closed, inches	8	8	8
Anchor Rod Diameter, inches	⅝, ¾	⅝, ¾	1
Minimum Strength of anchor without deformation, pounds	16,000	21,000	24,000



Hydraulic lift mounted on U-shaped steel frame with pump and pressure gauge for recording the pounds of pull applied to anchor rod. Tests at vertical and 45° angle showed ample mechanical strength of all parts, well balanced against holding power.

81

LINE MATERIAL

Line Construction Materials

Complete Coordinated Equipment for Distribution Today

ORANGEBURG *Fibre* CONDUIT

STANDARD *installed with Concrete* · **NOCRETE** *installed without Concrete*

THE trend is to underground. Result—the demand for Orangeburg Electrical Conduit is the greatest in 59 years. Public utilities, municipalities, industrial organizations and institutions are turning to Orangeburg Fibre Conduit more than ever for the permanent protection of their electrical services underground.

STANDARD for three or more ducts . . . installed *with* concrete encasement.

NOCRETE for one or two ducts . . . installed *without* concrete encasement.

WHY ORANGEBURG IS A LEADER IN EVERY CITY AND STATE

Orangeburg leads because it gives complete cable protection at lowest costs.

It is tough and resilient—lasts indefinitely.

Its impermeable walls and tight joints prevent corrosive ground waters from entering.

Smooth bore, low coefficient of friction, keep pulling tensions on cables to minimum.

Orangeburg protects cable sheaths from abrasion when cables are pulled in.

Long 8 ft. lengths, light in weight speed installations.

Taper-Sleeve Joints are made water tight by a few light taps of hammer.

Orangeburg lays faster and at lower cost than any other type of conduit.

Send to Department EW4 for new catalog 51.

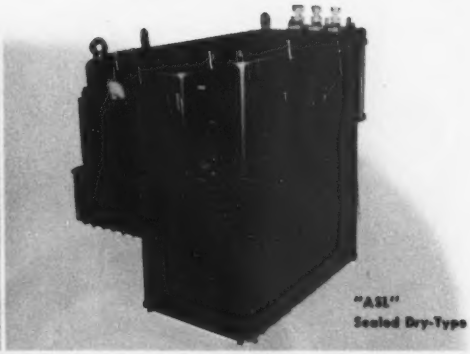
ORANGEBURG MANUFACTURING COMPANY, INC.
Orangeburg, N. Y.

GraybaR ELECTRIC COMPANY

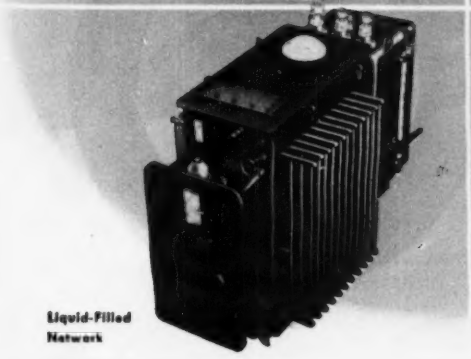
DISTRIBUTORS ORANGEBURG FIBRE CONDUIT

GENERAL ELECTRIC SUPPLY CORPORATION

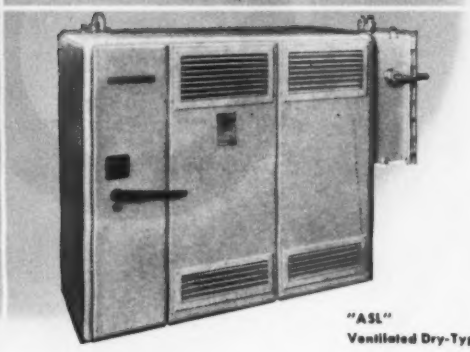
Pole-Mounted Transformers



"ASL" Sealed Dry-Type



Liquid-Filled Network



"ASL" Ventilated Dry-Type

Standardized Transformers make networks pay... *FASTER!*

Sure, network systems pay. The big savings come from continuity of service, flexibility to meet changing demand. But there's another important saving available right now. That's the saving you can realize in transformer costs. Standardization brings production economies that are passed directly to you.

These four-standard transformers meet every network requirement:

FOR GENERAL USE. Liquid-Filled Transformers, the workhorse of the network system. Available in sizes 1000 kva and below, 34,500 volts and below, oil or Inerteen® filled.

FOR INDOOR SERVICE. Dry-Type Transformers, ideal for indoor networks . . . lightweight, economical and maintenance-free. Available in sizes 1000 kva and below, 15,000 volts and below.

FOR GREATEST SAFETY. Sealed Dry-Type Transformers give greater safety for crowded areas, or where hazards like explosive gas atmospheres, corrosion or water conditions are not suitable for ventilated dry-type. 1000 kva and below, 15,000 volts and below.

TOPS FOR ECONOMY. Pole-Mounted Transformers for overhead networks. Available in a wide range of sizes, from 150 kva and smaller 15,000 volts and below.

Let us talk them over with you and point out the specific economies that can fit into your plans best. In addition, our complete facilities . . . engineers and calculating boards . . . are available to help you make future expansion more economical. Ask your Westinghouse representative, or write for booklets B-4028 and B-4002A. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-70587

YOU CAN BE SURE.. IF IT'S

Westinghouse

NETWORK TRANSFORMERS

Really RUGGED!

Instruments RUGGEDIZED by WESTON

Especially designed and built to meet the severe requirements of the specification for ruggedized instruments, MIL-M-10304. (Sig. C.)

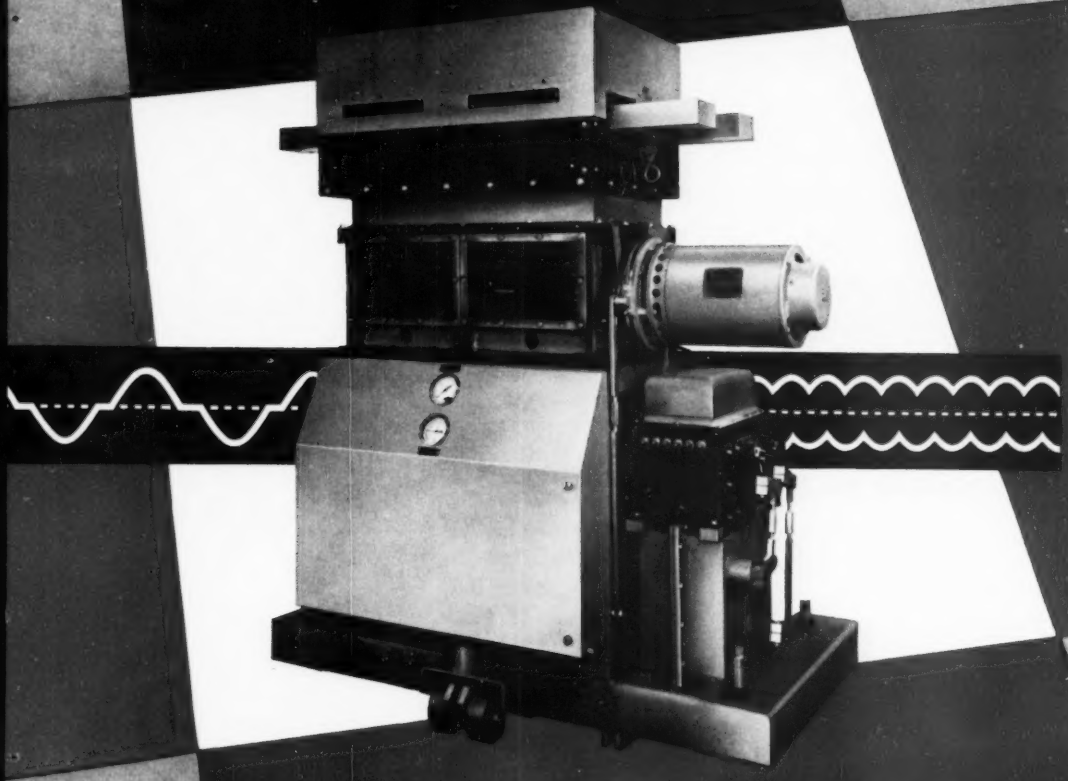
Real *ruggedizing* has been obtained not merely by stoutening and shock-mounting the instrument components . . . but by entirely *new designs,* employing *new materials* and *new techniques* developed especially for this purpose.

The result is an instrument that will continue functioning dependably under severe conditions of shock, vibration, temperature and humidity . . . conditions heretofore considered beyond the capabilities of such devices.

WESTON RUGGEDIZED INSTRUMENTS are available as d-c voltmeters, ammeters, milliammeters and microammeters in 2½" and 3½" sizes. Information on request. WESTON Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, New Jersey, manufacturers of Weston and TAG instruments.

9147 **WESTON** *Instruments* . . . INDICATE—RECORD—CONTROL

How to convert A-C to D-C with 96% overall efficiency!



By using an I-T-E Mechanical Rectifier

users of *heavy* d-c current (3000 amperes or greater) can convert a-c to d-c in the 50 to 400 volt range with an overall efficiency of 94% to 96%. By overall efficiency we mean from a-c line to d-c bus! This includes all losses—transformer, reactor, auxiliary devices, contacts, and control circuits. A glance at the following pages will give you the facts on the amazing efficiency and economy of the I-T-E Mechanical Rectifier.

I-T-E MECHANICAL RECTIFIER

How it works

Take a sine wave

Modify it like this with a *Permeron-core reactor

Make contact here ... Break contact here

Do it 1,296,000 times an hour and get this

...with a conversion efficiency of 96% or better

*I-T-E's special saturable core material.

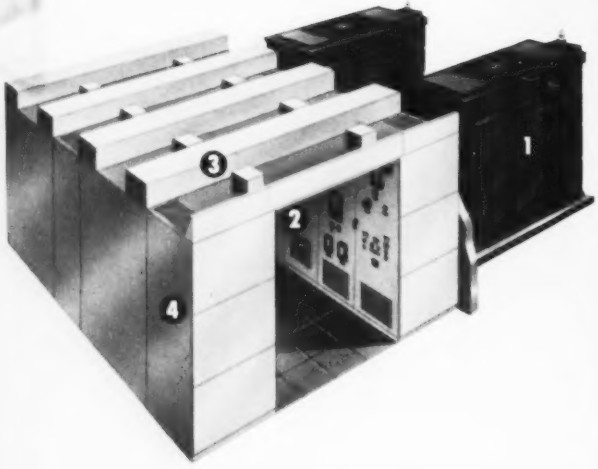
CAPACITY RANGE

3000, 4000, 5000, 6000, 7000, 8000, 9000 and 10,000 amperes in any voltage from 50 to 400 volts d-c.

Primary voltages up to 25,000 volts, three phase a-c.

One or more units may be connected in parallel to give any higher d-c current rating.

A Complete Installation

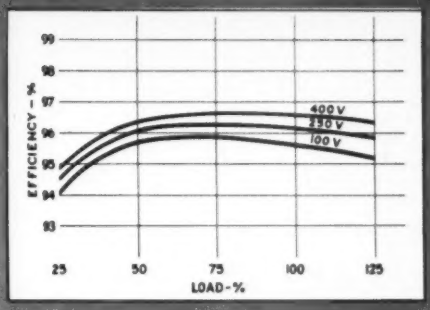


A complete I-T-E Mechanical Rectifier installation includes a transformer, commutating reactor, contact mechanism, d-c switchgear and associated instruments and controls. A-C supply is fed into the *combined* transformer and commutating reactor (1). The reactor is made with the special core material, Permeron. Its use puts a "step" in the sine wave of the a-c current. From the reactor the "stepped" sine wave travels into the contact mechanism (2). By breaking the circuit during the step at zero current, the contact mechanism converts a-c to d-c without arcing. From the contact mechanism d-c current travels through the overhead bus (3) to the d-c switchgear (4) which feeds the load.

94 to 96% efficiency over 25 to 125% load range!

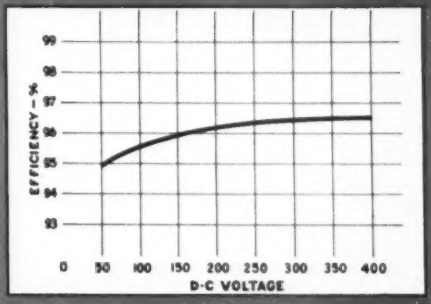
LOAD—EFFICIENCY

One of the chief advantages of the I-T-E Mechanical Rectifier is its consistently high efficiency over a wide load range. A glance at the load—efficiency curve shows Mechanical Rectifiers have very close efficiencies even with a difference of 300 volts in rating. Note too, the high efficiency at only 25% of rated load.



D-C VOLTAGE—EFFICIENCY

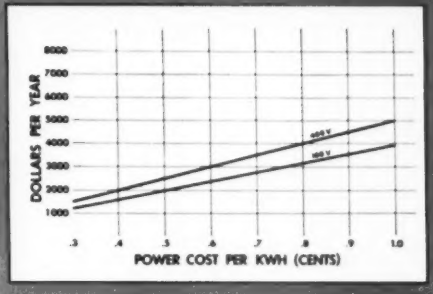
The curve d-c voltage—efficiency, shows that within the 50 to 400 volt range, Mechanical Rectifiers hold their efficiency within a very narrow zone. This means d-c can be efficiently utilized at lower voltages than formerly possible.



Cuts Power Bills!

POWER COST—SAVINGS

The power cost—savings curve developed here from figures published by *Chemical Week* shows the savings possible with I-T-E Mechanical Rectifiers, operating at 100 volts and 400 volts. Where large blocks of power are used, even a slight improvement in efficiency can save thousands of dollars. Suppose for example, you are purchasing 2000 KW for 24 hour operation, 350 days a year. A simple calculation will show how much you can save with only a 3% gain in efficiency, brought about by using a Mechanical Rectifier:



2000 x 24 x 350 = 16,800,000 KWH/year

With a 3% improvement in efficiency you save:
(16,800,000) (.03) = 504,000 KWH/year

Assuming a nominal industrial rate of 7 mills/KWH
(504,000) (.007) = **$3,528** yearly saving.

I-T-E MECHANICAL RECTIFIERS

...offer these advantages:

- HIGH EFFICIENCY—superior to that of any other type of low-voltage rectifier. 94% to 96% over a wide load range.
- SMALL SPACE REQUIREMENT—extremely compact metal-enclosed units of modern design.
- LOW BUILDING INVESTMENT—no need for special foundations, high ceiling or crane facilities.
- LOW INSTALLATION COST—no special equipment needed for installation. Just unload, put in place, connect, and operate.
- AVAILABILITY FOR SERVICE—no waiting required for equipment to warm-up or get up to speed.
- LOW MAINTENANCE COST—main contacts need only occasional replacement. Auxiliary equipment is reasonably maintained because of light duty and standard nature.

When planning new or expanded conversion facilities you can take full advantage of I-T-E products all along the line. For in addition to the Mechanical Rectifier, I-T-E can supply unit substations, a-c and d-c switchgear, individual circuit breakers and bus. By specifying I-T-E all the way from the power company's line to individual load, you'll have a completely integrated, uniform power system. The system will be safe, efficient, and practical because it was designed and built by specialists.

ERE'S USEFUL INFORMATION ON SELECTING OWER CONVERSION EQUIPMENT

Write for the following bulletins. They'll tell you more about the Mechanical Rectifier and what it will do for you.

BULLETIN 5106 —Covers simple theory, space requirements, and standard arrangements.

BULLETIN 5204 —Gives details on I-T-E's special magnetic core material "Permeron."

BULLETIN 5205 —Deals with the engineering aspects of the I-T-E Mechanical Rectifier's efficiency.

I-T-E

MECHANICAL RECTIFIERS

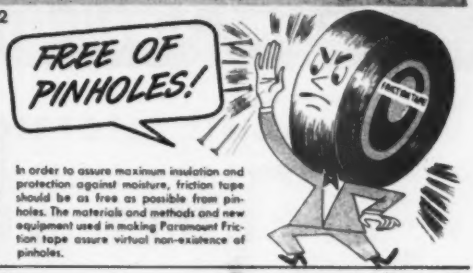
I-T-E CIRCUIT BREAKER COMPANY
Mechanical Rectifier Division
19TH AND HAMILTON STREETS, PHILADELPHIA 30, PENNSYLVANIA
Canadian Mfg. and Sales: Eastern Power Devices, Ltd., Toronto
Export Sales: Philips Export Corp., N. Y. 17, N. Y.

PARAMOUNT FRICTION TAPE by Haartz-Mason

1

Made under the most exacting requirements in the industry, Paramount Friction tape can be tightly wrapped — yet can be torn readily as required. A margin of safety in this respect is added to every roll of Paramount Friction tape.

2



In order to assure maximum insulation and protection against moisture, friction tape should be as free as possible from pinholes. The materials and methods and new equipment used in making Paramount Friction tape assure virtual non-existence of pinholes.

3

Automatically cut with smooth, neat edges on Cameron cutting machines. These machines wind it on the cores under tension. This is your insurance against ravelling.

4

Under controlled temperature and humidity, Paramount Friction tape is strictly tested for permanence of adhesion.

5

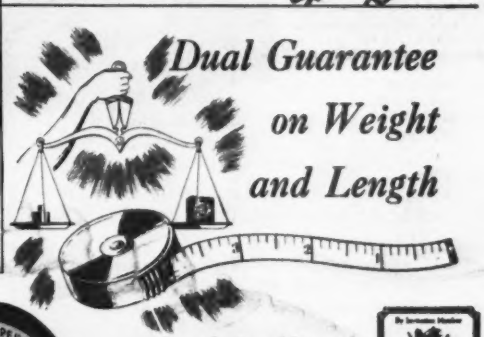
Taken from stock at regular intervals, sample rolls of Paramount Friction tape undergo accelerated aging tests in an electric oven at 212° F. for 16 hours. Thus you get a guarantee of maximum aging ability.

6

Every roll of Paramount Friction tape is sold with guaranteed minimum footage per roll plus . . . guaranteed weight. You are left in no doubt about what you are getting. And so you know you will cover the largest area most efficiently at the lowest cost.

7

To sum up, Paramount Friction tape, besides being made of finest materials, also undergoes rigorous pre-testing at the factory. Among the rigidly conducted tests are those for aging, adhesion and strength.



Manufactured by

Haartz-Mason, Inc.

WATERTOWN 72, MASS.

Rise Leaders of the Ninth Association

Advanced Protective Performance ...Extreme Simplicity of Design

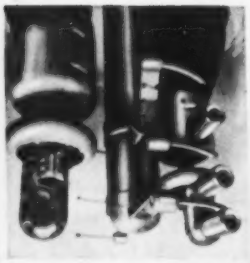
138- to 230-kv 3-cycle
115-kv 5-cycle
(Also other styles, 7.5 kv and up)

PACIFIC ELECTRIC Type RHE

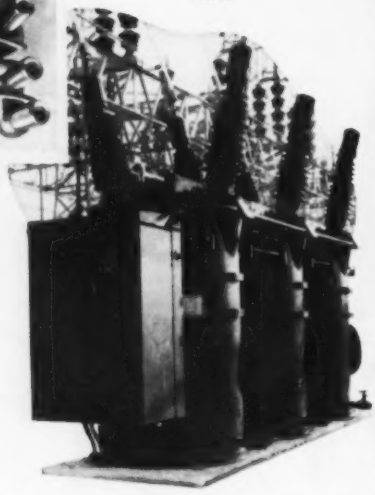
HIGH-SPEED RECLOSING

CIRCUIT BREAKERS

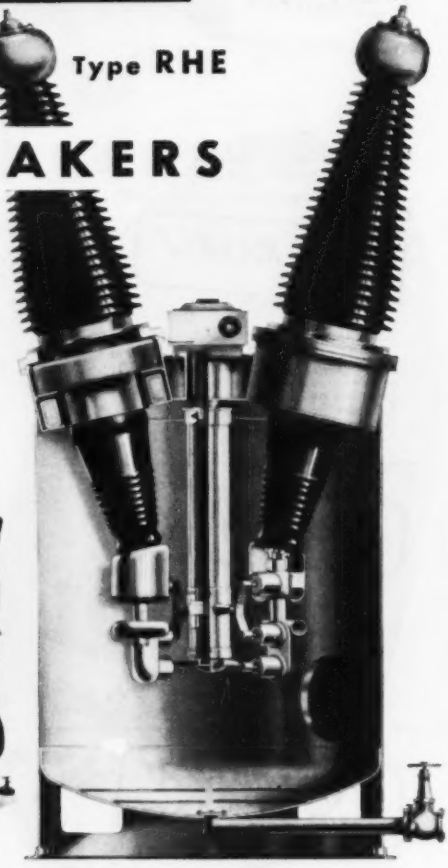
to 10,000,000 Interrupting Kva (at 230 kv)



Above:
Interior of Tank, Showing Blades and Interrupters—Circuit Breaker Open.



At right:
Sectional Elevation of 196/230-kv Type RHE.



At right:
Type RHE in OKLAHOMA (138 kv).

NEMA and ASA STANDARD

A ONE-PIECE Six-break rotary blade unit is all that moves within the tank of a PACIFIC Type RHE oil circuit breaker.

Interrupters are of simple self-pressurizing type; their exceptional performance is due to improved utilization of directed oil flow and high speed of developing open-gap distance. The configuration of interrupter assemblies also permits use of the simplest method of obtaining voltage division between the six breaks in series per pole—capacitance grading shields.

Many fault interruptions on a symmetrical or asymmetrical (A.S.A.) basis—including a series of tests extending to 9,600,000 kva at 240 kv (A.S.A.)—confirm the ratings of these interrupters.

These and other advanced features contribute to low maintenance cost, ease of adjustment, and reliability of operation.

Write for Catalog 585

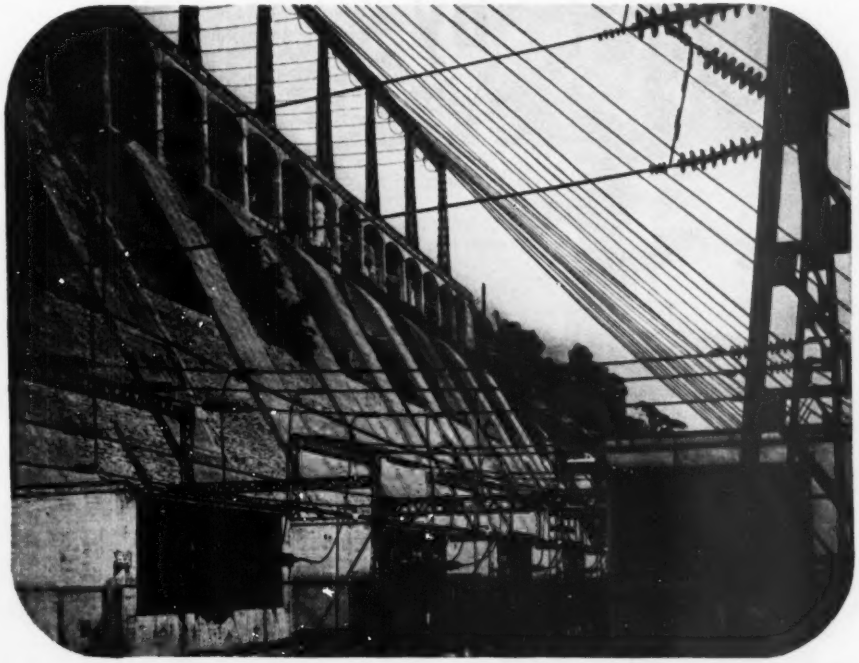
PACIFIC ELECTRIC MFG. CORPORATION

5815 THIRD STREET, SAN FRANCISCO 24, CALIFORNIA • 4500 HARRISON STREET, GARY 10, INDIANA

Since 1906

SALES OFFICES or AGENCIES in PRINCIPAL CITIES

V. C. CABLE



Specify Roebling V. C. Cable for top resistance to heat, oil and grease

THROUGH continual laboratory developments and progressive manufacturing methods, Roebling Varnished Cambric Cable has been constantly improved. Today this cable has absolutely top resistance to heat, oil and grease . . . and it's the most dependable cable you can use for leads on generators, transformers, motor and oil switches, and for general distribution of heavy power loads in manufacturing and industrial plants.

Roebling V.C. is made in single conductor sizes from 2,000,000 C.M. to #14 A.W.G.; in multiple conductor sizes from 750,000 C.M. to #14 A.W.G. Recommended for use to 17,000v between phases in single or multiple conductor construction; and to 26,000v for single conductor grounded neutral.

Large quantities of Roebling's complete wire and cable line are now required for rearmament. We and our distributors will, however, do all that we can to meet your needs. John A. Roebling's Sons Company, Trenton 2, N. J.

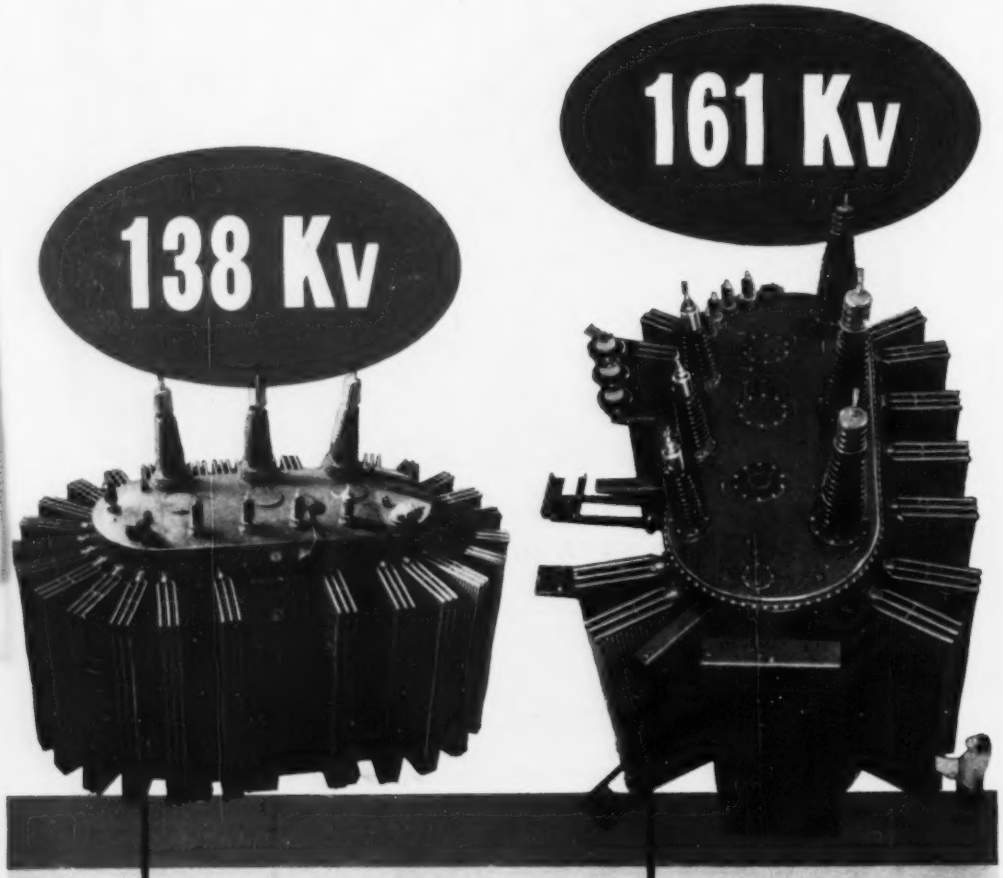
ROEBLING

ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. & 5 PITTSBURGH ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 701 ST. CLAIR AVE., N. E. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. & 120 S. HEWITT ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH 1301 CLARK BLDG. • ROCHESTER, 1 FLINT ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • ST. LOUIS, 3001 DELMAR BLVD. • TULSA, 221 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, NEW JERSEY

High Voltage POWER

by

Pennsylvania



37,500/50,000 Kva. 3 Phase, 60 Cycles, 132,000 Grd.Y—24,000Y/13,860 volts—6900Δ volts. Self-cooled/forced-air-cooled. Inert gas pressure system of oil preservation.

30,000 Kva. 3 Phase, 60 Cycles, 154,000 Grd.Y—115,000 Grd.Y—12,470Δ volts. Self-cooled. Inert gas-oil seal system of oil preservation.

TRANSFORMERS

230 Kv

Typical of the many higher voltage power transformers now under construction in the Pennsylvania plant are the recently-completed units pictured here. They represent single and three-phase transformers of core-form and shell-form construction.

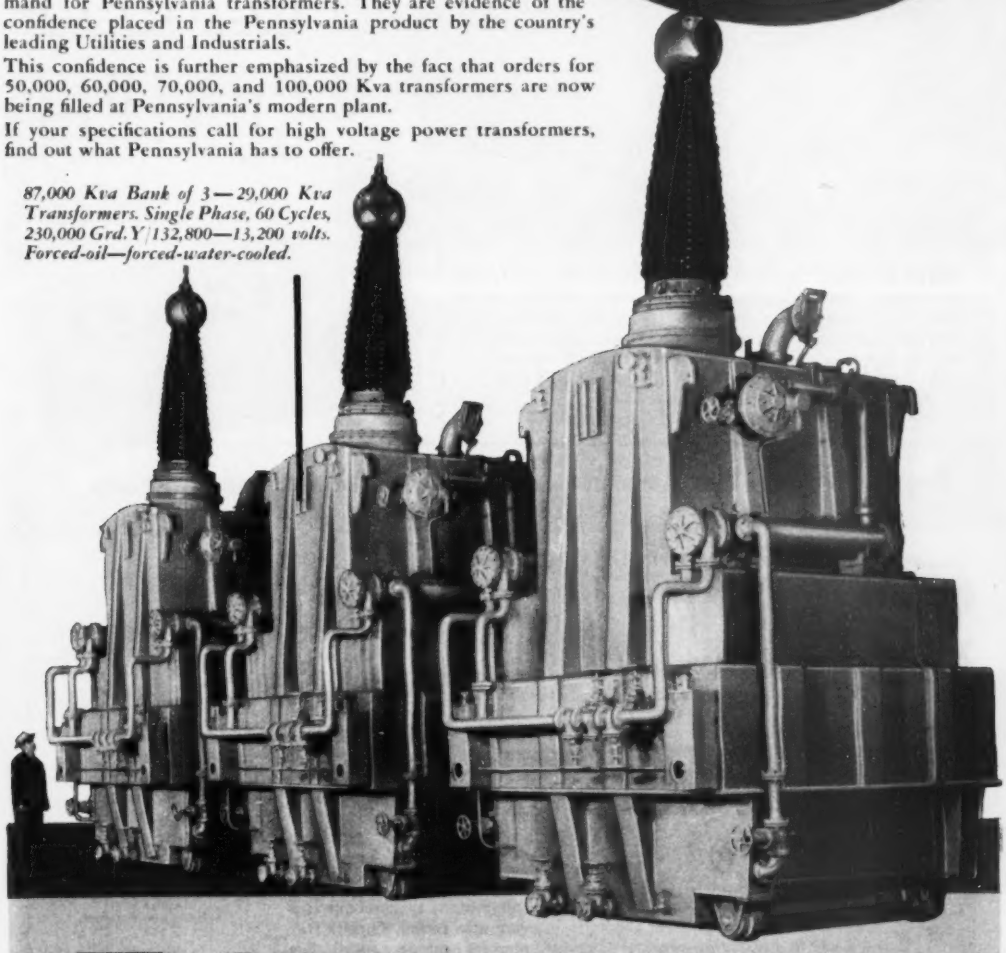
Each transformer is designed and manufactured with the extra care and precision which will pay dividends to the user in the form of outstanding reliability and low operating costs.

These units represent the growing acceptance and increased demand for Pennsylvania transformers. They are evidence of the confidence placed in the Pennsylvania product by the country's leading Utilities and Industrials.

This confidence is further emphasized by the fact that orders for 50,000, 60,000, 70,000, and 100,000 Kva transformers are now being filled at Pennsylvania's modern plant.

If your specifications call for high voltage power transformers, find out what Pennsylvania has to offer.

87,000 Kva Bank of 3—29,000 Kva Transformers. Single Phase, 60 Cycles, 230,000 Grd. Y/132,800—13,200 volts. Forced-oil—forced-water-cooled.

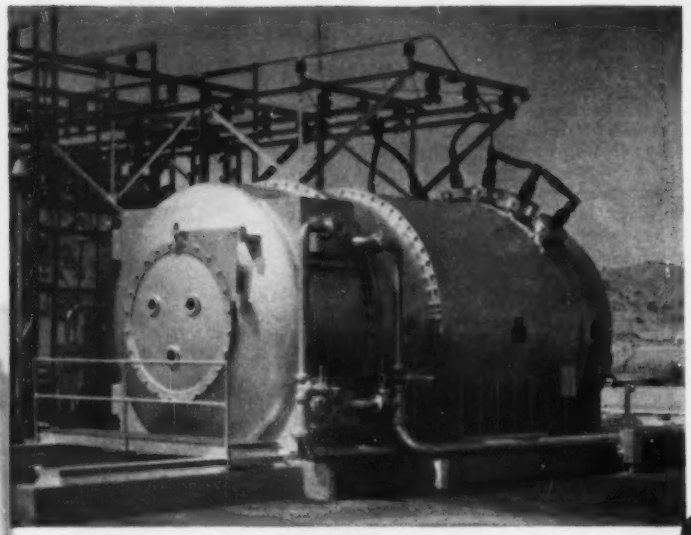


Pennsylvania TRANSFORMERS

Pennsylvania TRANSFORMER COMPANY

CANONSBURG, PENNA. • *Greater Pittsburgh District*

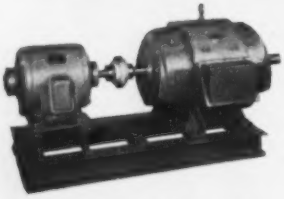
Synchronous Condensers do a GOOD JOB



BETTER with REGULEX CONTROL

WHEN *REGULEX* regulators guard synchronous condensers from excessive overload and pole slipping, they assure the best possible job of line voltage regulation. That's why this 40,000/16,800 kva condenser, supplying reactive kva to stabilize a long transmission line, is equipped with *Regulex* control. Even under adverse conditions it's kept on the line . . . automatically supplying the maximum safe amount of corrective kva. A-3674

Regulex Control is Accurate . . . Simple to Adjust and Maintain



THE MOTOR-DRIVEN *Regulex* exciter is conservatively rated for long life. Since it's similar in construction to a dc generator, the same periodic inspection routine can be followed. No special training of maintenance personnel is required.

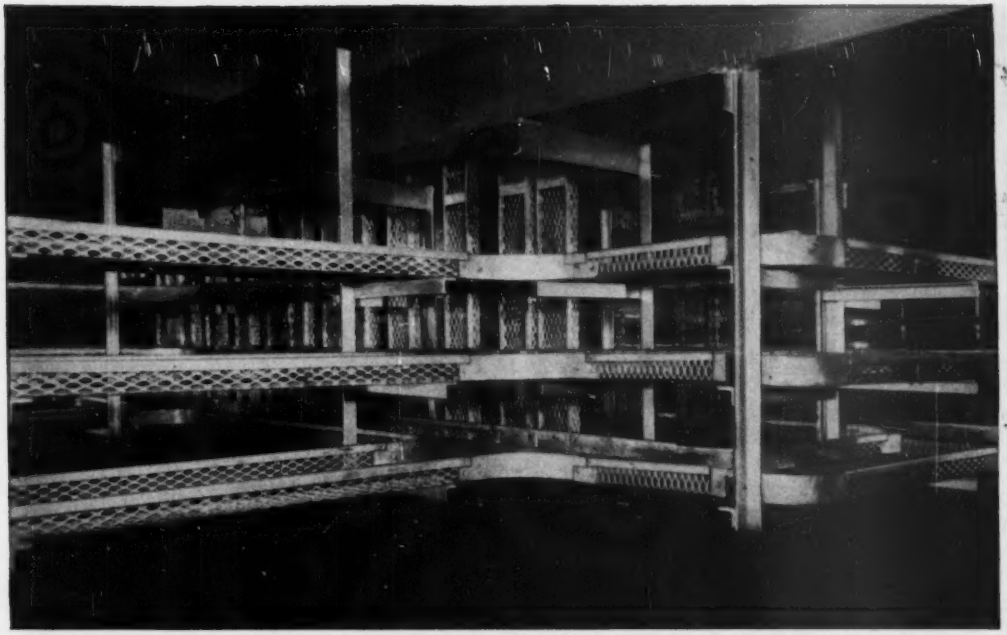
ONLY THREE operating controls needed: (1) a control switch places regulator in and out of service; (2) a second switch controls the motor-operated main exciter field rheostat; (3) a voltage adjusting device selects proper ac regulated voltage.

COMPONENTS of the *Regulex* voltage regulator in this cabinet have no moving parts, require no maintenance or adjustment after installation. This single control cubicle can be placed in any convenient spot or combined with switchgear equipment.

★ **You can use *Regulex* voltage regulators on alternators, synchronous condensers, and large synchronous motors. In every application, *Regulex* control gives fast response, provides accurate, sensitive voltage control. See your A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.**

Regulex is an Allis-Chalmers trademark.

ALLIS-CHALMERS



The NEW Cope Cable Trough Enables You To CUTS COSTS UP TO 66%

An outstanding utility company reports that on a large job their installation of Cope Cable Trough saved them 66% of the cost of a conduit installation!

Savings are always made when Cope Cable Trough is used—real savings in material, labor and costs.

Such savings are not only necessary at all times, but doubly so during our Country's State of Emergency.

In most cases Design Engineers can order standard Cope Cable Trough and Fittings for a complete installation job, but in cases where special fittings are required they have Cope Engineers to help solve their problems. The elimination of costly engineering—the ease of installation—man-hour reduction—all of these factors reduce costs and increase savings through the use of Cope Cable Trough.

If you want to save—and you *will* save—write now for the detailed bulletin on Cope Cable Trough.

You know Cope by these Products . . .

T. J. Cope INC.

T. J. COPE, INC., 711 SOUTH 50th ST.
PHILADELPHIA 43, PENNSYLVANIA

CREOSOTED

POLES • PLANKING
CROSSARMS
CONDUIT

The high initial strength of Amcreco Creosoted poles remains practically constant throughout the long life of the pole.

AMERICAN CREOSOTING COMPANY
INCORPORATED

COLONIAL CREOSOTING COMPANY

AMCRECO

GEORGIA CREOSOTING COMPANY

General Sales Office—Chicago, Illinois

Current and potential transformers are combined in one unit for single or three-phase systems, 2.5 to 161 kv, in Westinghouse Type MP Metering Outfits. Enclosed in pressure-tight steel cases, with cover-mounted bushings and cover-suspended elements, they meet highest accuracy standards.

Because he handles the most complete line in the industry, your Westinghouse representative has specific answers for all your instrument transformer problems. Call him today, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70618

You can be sure if
Westinghouse

INSTRUMENT
TRANSFORMERS

A man's work is his Cathedral

Edwin F. Guth, Sr., has given fifty years of his life to his work with almost religious devotion. His efforts have been rewarded.

His company, now celebrating its Golden Anniversary, is recognized as one of the leaders in the lighting industry. He has achieved fame for his contributions to the betterment of lighting. We at GUTH pause to honor this man who has shaped the past and future of our company.

Thanks, E. F. Guth, Sr. And thanks to all of you who have been so wonderful to us during this past half-century.

THE EDWIN F. GUTH CO. / ST. LOUIS 3, MO.

"...his deeds have made us what we are today"

In devoting a half-century to his work, Edwin F. Guth, Sr., has built a record of accomplishments that stands as a monument to his untiring spirit:

Founded our company April 22, 1902.

Invented over 150 patented lighting devices.

Designed the world-famous BRASCOLITE.

Introduced the first "Packaged" Lighting Fixtures for distribution through wholesalers.

Designed and manufactured cast bronze lighting equipment for many state capitols and other public buildings all over the world.

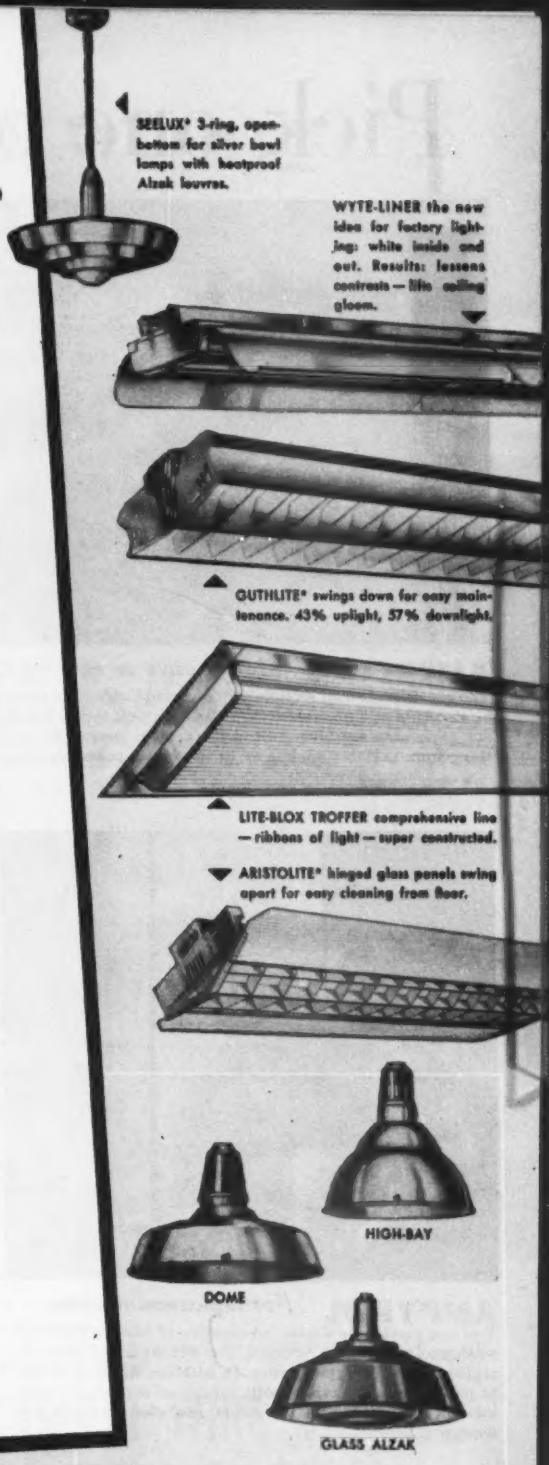
Produced the finest reflector finishes as they were developed—Alzak Aluminum, Porcelain Enamel, 300° White, and Electroplated Finishes.

Created the famous GUTHFAN—the first improved fan over a 30-year period.

Designed and manufactured lighting equipment through all stages of lighting development—Gas Fixtures, Gas Mantles, Combination Gas & Electric, Carbon, Gem, Tantalum, Tungsten, Mercury, Fluorescent, and Germicidal—from 1902 to the present.

Honored by the National Association of Manufacturers which named him, "A Modern Pioneer on the Frontier of American Industry".

THE EDWIN F. GUTH CO. / ST. LOUIS 3, MO.


SEELUX* 3-ring, open-bottom for silver bowl lamps with heatproof Alzak louvres.
WYTE-LINER the new idea for factory lighting: white inside and out. Results: lessens contrasts—lifts ceiling gloom.
GUTHLITE* swings down for easy maintenance. 43% uplight, 57% downlight.
LITE-BLOX TROFFER comprehensive line—ribbons of light—super constructed.
ARISTOLITE* hinged glass panels swing apart for easy cleaning from floor.
HIGH-BAY
DOME
GLASS ALZAK

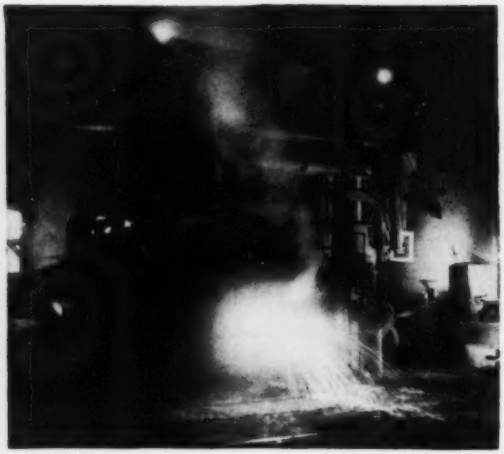
INDUSTRIAL INCANDESCENT reflectors for better light control at the working plane.

* ® and Patents Pending

Pick one of these and

AMERCLAD ... *for abusive service*

You can do just about anything to Amerclad Cables. They can be soaked in acid mine water, dragged over rock, reeled in and out, exposed to sunshine. Amerclad is made in sizes to fit anything from portable appliances to 45 cu. yd. power shovels.

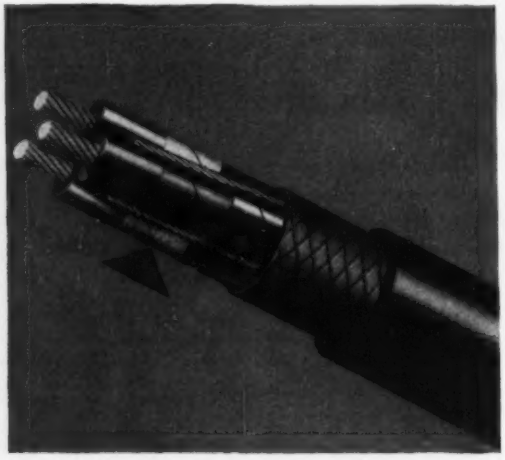


AMERBESTOS ... *for the hot spots*

When it's too hot for anything else, use Amerbestos. Our special "felted" construction enables the fibres to *stay put* even when the conductor is sharply bent. There's a full range of sizes to fit electric stoves or electric furnaces.

AMPYROL ... *for replacement wiring*

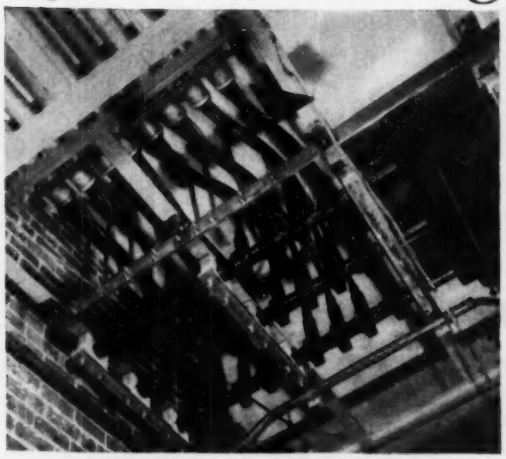
You can practically *double* the capacity of existing raceways when you rewire with Ampyrol. Six #12 Ampyrol wires can replace four #14 Type R wires. In addition, Ampyrol is easy to pull because it has a smooth, lubricated surface. For easy identification, the brilliant colors run clear through the insulation.



PS SHIELDING ... *for safety*

PS Shielding is a conducting rubber tape or compound, the original development of American Steel & Wire. It's available on all our high voltage cables to supplement or sometimes replace metallic shielding. Unlike metallic shielding, PS Shielding clings so tight that no gaps can form to cause corona discharge within the jacket. It's easy to splice and is not bulky.

you can't go wrong



VARNISHED CAMBRIC

... for heavy loads

Varnished cambric cables have an unexcelled combination of high dielectric strength, chemical stability (against oil and ozone) and long life at high temperatures. Also available in the form of AVC for extra heat resistance.

PAPER ... *for high voltages*

Paper insulated, oil impregnated and lead sheathed cables are rigorously checked with a high voltage time test, dielectric power loss test and power factor test. These cables are first choice for high voltage, trouble-free service.

Choose from hundreds of types and sizes of American Electrical Wire & Cable

We'll be pleased to give you more information on any of these quality wires and cables. Or, if you have a special problem, we'll be glad to give you a complete engineering analysis and discuss the many types of special purpose wires and cables not mentioned here. Just get in touch with your nearest American Steel & Wire office or write: American Steel & Wire Division, United States Steel Company, Rockefeller Building, Cleveland 13, Ohio.

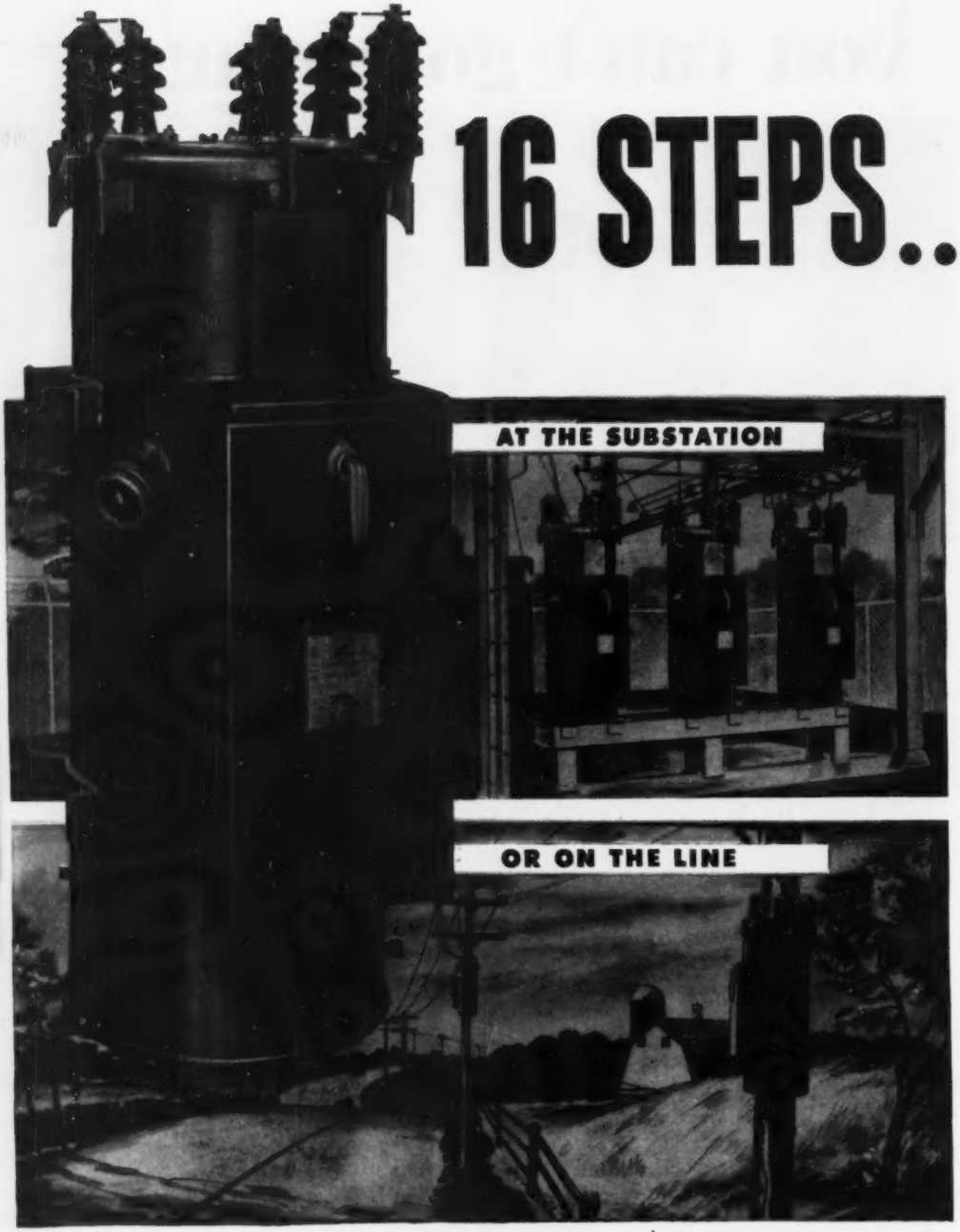
AMERICAN STEEL & WIRE DIVISION
USS
AMERICAN ELECTRICAL WIRE AND CABLE
UNITED STATES STEEL

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL COMPANY
GENERAL OFFICES: CLEVELAND, OHIO
IN THE WEST—COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • IN THE SOUTH—TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S AMERICAN ELECTRICAL WIRE & CABLE

UNITED STATES STEEL

16 STEPS...



Close Regulation, Reliable Operation ...at the *LOWEST COST!*

Check these Westinghouse Voltage Regulator advantages. Compare them. The Westinghouse URL-16 with 16, 1¼ steps provides:

- ★ Low maintenance cost . . . made possible with a minimum number of tap-changer operations and a minimum number of contacts and moving parts.
- ★ Voltage regulation within ± 1-volt band width.

Only the Westinghouse URL-16 has these features:

1. Complete surge protection with "De-ion®" arresters on each line bushing.
2. Direct Geneva Drive Mechanism has controlled contact speed for long contact life, minimum maintenance.
3. Package control in one Flexitest® unit for maximum flexibility and interchangeability.
4. Simplified control has voltage regulating relay with integral inverse time delay.

IMPROVED CONTROL CABINET . . . Control cabinet door is hinged at bottom to provide a "workbench" when in open position. Control cabinet may be mounted integrally with the regulator or on the pole below the regulator.

FOR FURTHER INFORMATION on the new URL-16 Regulator, call your Westinghouse representative, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-70631

Westinghouse URL-16 Voltage Regulator—easy to install, easy to maintain, . . . engineered for every condition of weather . . . every condition of service.

YOU CAN BE SURE . . IF IT'S

Westinghouse

VOLTAGE REGULATORS

BI-SEAL SELF-BONDING ELECTRICAL INSULATING TAPE

BI-SEAL CUTS SPLICING TIME AND COST

- NO STICKY ADHESIVES . . . EASY TO APPLY IN CLOSE CLEARANCES
- NO RIGHT OR WRONG SIDE . . . BOTH SIDES USABLE
- NO TACKY SURFACES TO PICK UP DUST OR FOREIGN MATTER
- WILL NOT TANGLE OR STICK TOGETHER
- REQUIRES NO SPECIAL APPLICATION TECHNIQUES
- CAN BE STORED INDEFINITELY

Here is the *multi-purpose* electrical insulating tape for wire or cable splicing . . . the tape that meets your strictest requirements for many unusual as well as innumerable ordinary applications. BI-SEAL offers you complete and lasting protection against moisture, acids, alkalies, sunlight, corrosion, fungus and ozone. These outstanding characteristics, plus Bi-Seal's excellent electrical properties, make it ideally suited for a broad range of applications in the Communications, Electronics, Public Utilities, Electrical Contracting and Electrical Maintenance fields.

WRITE TODAY for free illustrated booklet, "Insulating Wire and Cable Splices with Bi-Seal Self-Bonding Electrical Insulating Tape."

CHECK THESE BI-SEAL FEATURES:

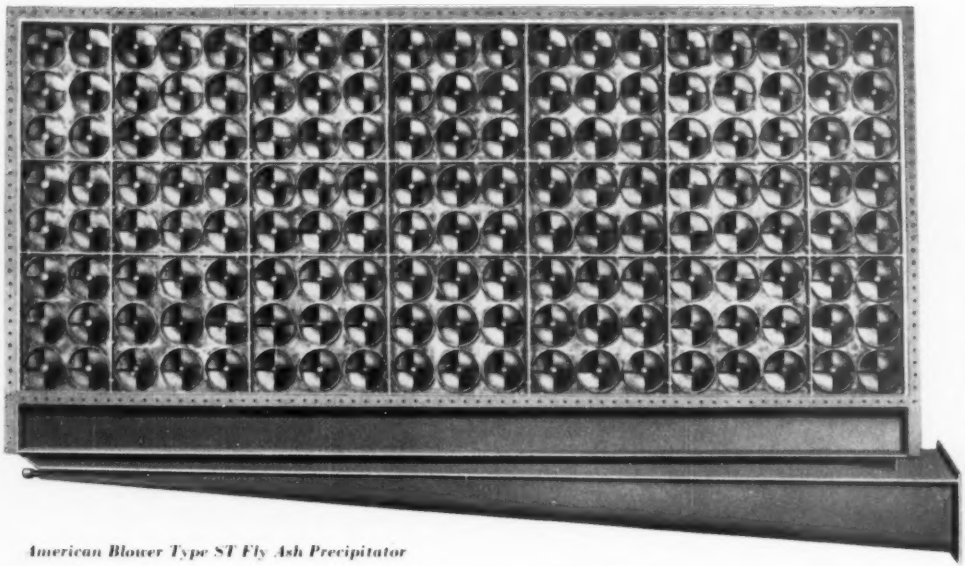
- Self Bonding
- Moisture Resistant
- Outstanding for Low Temperature Application and Performance
- High Dielectric Strength
- Superior Aging Properties
- Conforms to Irregular Shapes
- Corrosion and Chemical Resistant
- Performs Efficiently on Any Insulation

BISHOP MANUFACTURING CORPORATION

10 CANFIELD ROAD • CEDAR GROVE, N. J.

"Manufacturers of Electrical Insulation Since 1847"

American Blower . . . a time-honored name in air handling



American Blower Type ST Fly Ash Precipitator

Memo to Power Plant Men—

In collecting fly ash from pulverized fuel-fired or stoker-fired boilers you'll have a higher efficiency curve over a wider range of operation if you install American Blower Type ST Fly Ash Precipitators.

AMERICAN BLOWER

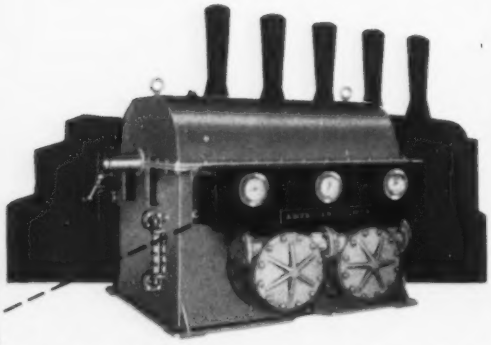
AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary Corporation

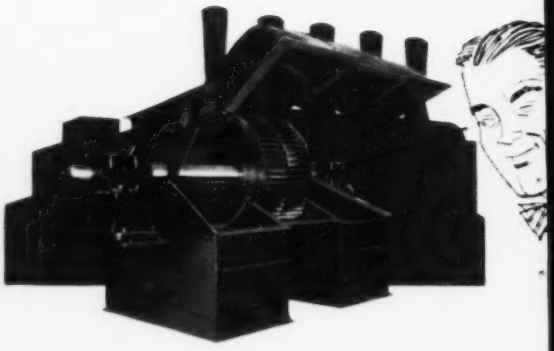
Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • ACME CABINETS • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

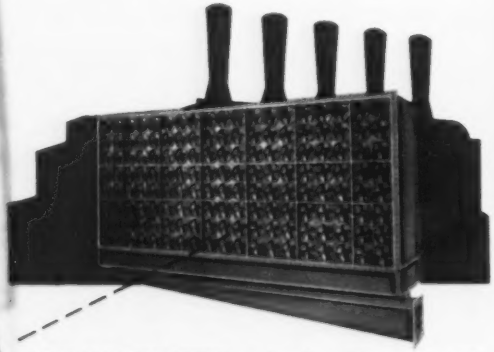
It all depends on how you look at it



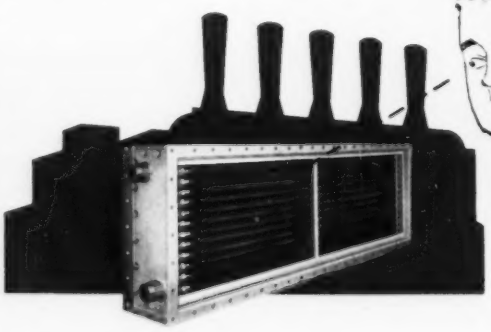
TO A CONTROL MAN this American Blower Class 6 Gyrol Fluid Drive, for flexible control of boiler feed pumps, looms up as big as this in relation to a power plant. He sees, too, American Blower Class 4 Fluid Drive for fan control.



TO A MECHANICAL DRAFT MAN a Sirocco Multi-Blade Fan, which delivers more gas per revolution than any other type, takes *this* proportion in the picture. He could see an American Blower HS Fan equally large if thinking of forced draft.



TO A FLY ASH EXPERT an American Blower Type ST Fly Ash Precipitator looks like this in relation to the rest of the power plant. Little wonder, for the Precipitator lifts a load off his shoulders and minimizes a nuisance.



TO A COIL MAN American Blower Heavy Duty Steam Coils would appear like this in his power plant picture. He likes their great strength, easy accessibility and the way they withstand the high pressures of heavy loads.

Looking at your complete power plant picture, we believe you'll find, as hundreds of others have, that all these American Blower Products improve over-all power-plant efficiency and insure years of dependable operation. Call our nearest Branch Office for complete data.

AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary corporation

Serving home and industry

AMERICAN STANDARD • AMERICAN BLOWER • ACME CABINETS • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

On Staten Island wiring repairs...

Plastic tape cuts cleanup time, too!

"Scotch" No. 33 Electrical Tape speeds repairs and re-wiring because it strips cleanly from old connections—never leaves gummy adhesive residue. And there's no heavy oxidation on the wiring, either, when "Scotch" No. 33 is on the job—no greening of copper that requires extra cleanup time.

Of course "Scotch" No. 33 Electrical Tape *always* saves time on *new* wiring jobs! It takes the place of two conventional insulating tapes . . . gives more splices in less time—more splices in less space, too.

That's what Staten Island Edison Corporation has found, and they've been using "Scotch" No. 33 Electrical Tape indoors, outdoors—even under ground for the last 3 years!

Try it yourself! Order a supply today!

CABLE SPLICER applies "Scotch" No. 33 Electrical Tape on secondary "hycrabs" in manhole. Plastic backing of tape has high resistance to water, salt water, acids, oils, alkalies, alcohols and other solvents.

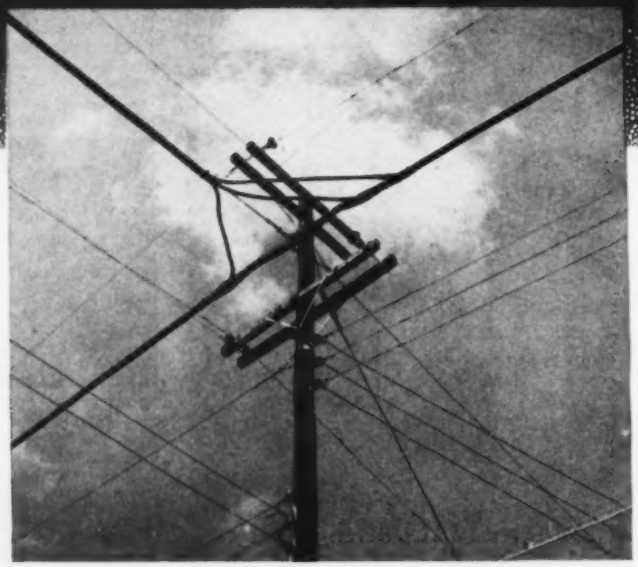
"BUG" CONNECTORS on this 3-wire service are insulated with "Scotch" No. 33 Electrical Tape. Super-thin caliper (only .007 inch) combined with high dielectric strength (10,000 volts) makes this tape ideal.

LINEMAN tapes pole end of 3-wire service with "Scotch" No. 33 Electrical Tape prior to connecting to pole. Plastic backing of tape stretches to conform tightly to odd shapes and surfaces.

SCOTCH
BRAND
Electrical Tape
No. 33

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by Minnesota Mining & Mfg. Co., St. Paul 6, Minn.—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 270 Park Avenue, New York 17, N. Y. In Canada: London, Ont., Can.

DO YOUR OVERHEAD LINES LOOK LIKE THIS?



This photograph shows many of the reasons why you should consider installing aerial cable instead of line wire. Notice what a neat, compact job the linemen have done and how unobtrusively the cable fits into the picture. Wouldn't you like your overhead lines to look like this?

It is a safe job too because the cable is completely insulated. Even if the cable should fall, which is highly unlikely, there is little or no danger to passers-by. Experience has shown that insulated aerial cable is the safest form of above ground transmission. Wouldn't you like that?

Notice how flexible the installation is too. See what a good looking "Y" tap has been taken off and notice the streamlined appearance of the splices. There is little danger here from swinging arcs or grounds caused by wet conditions. This type of an installation will reduce your trouble calls from owners of television sets. Wouldn't you like to increase safety and cut down on customer complaints?

Insulated aerial cable leaves the pole in an uncluttered state. Wouldn't you like to leave the impression with your customers that you practice good housekeeping?

These advantages and more can be yours if you use Simplex Aerial Cables. You will find that they are exactly what you want. They are made in various styles and sizes to meet varying conditions. Want more information about these versatile distribution lines? A note to the address below will bring it to you without obligation.

Simplex - WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 SIDNEY STREET,
CAMBRIDGE 39, MASS.

Joslyn *Fast Action* CUTOUT

Engineered for Reliability

Serves Distribution Systems more Effectively

Available in ratings of 7.8 and 15 kv, 100 amp.

Pole and Cross Arm Mounting

1

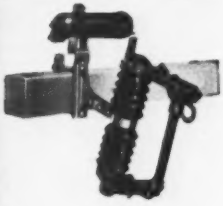
General Purpose Fuse Cutout — fast pull out with rapid current interruption — delayed, full drop-out after clearing, preventing arcing at contacts. Will take any universal type fuse link within its rating.

2

All the features of 1 plus the patented low cost Load Breaker attachment enabling manual interruption of loads up to 100 amperes for capacitor banks, small substations, line sectionalizing, etc.

3

All the features of 1 and 2 plus the positive protection against lightning provided by the Joslyn Arrester in an effective compact unit with the extra advantages of safety, space-saving and low cost.



JOSLYN 1902 1952 50th ANNIVERSARY

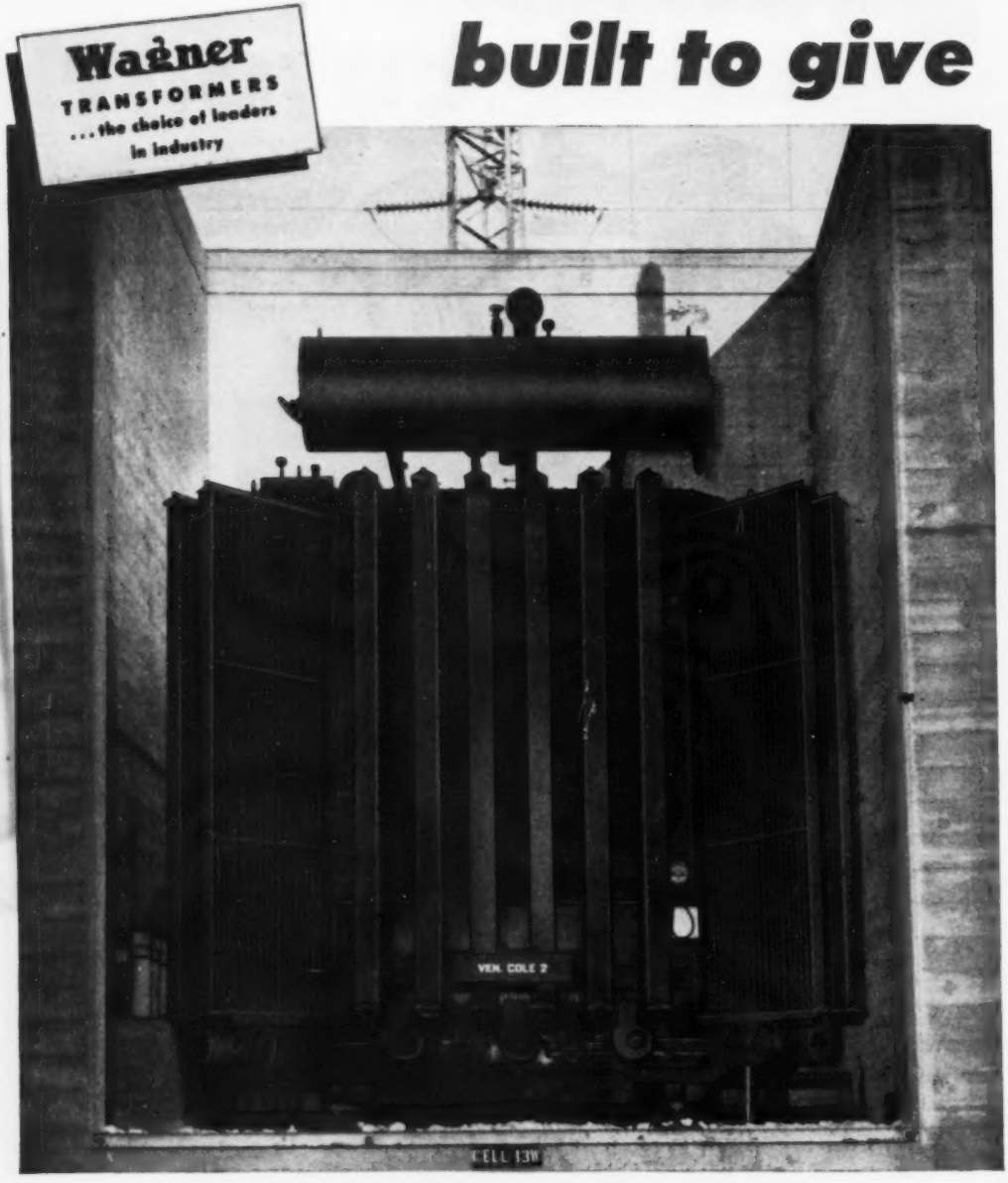
Joslyn MFG. AND SUPPLY CO.

BRANCH OFFICES IN PRINCIPAL CITIES

20 North Wacker Drive, Chicago 6, Ill.

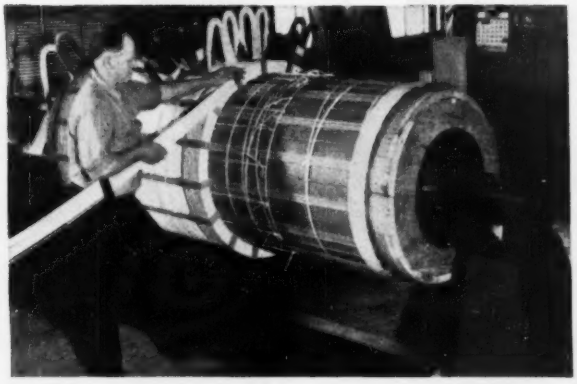
The Joslyn Co. • The South East Joslyn Co.
Southern Joslyn Co. • Joslyn Southwest Co. • Joslyn Pacific Co.

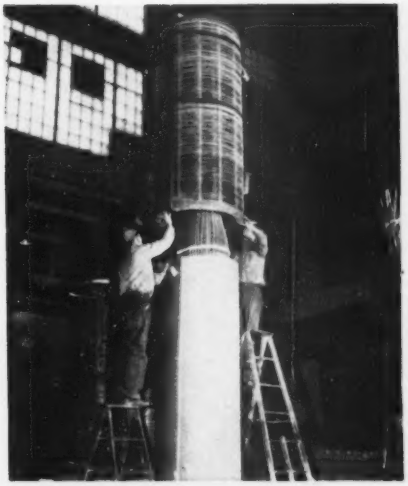
Wagner
built to give

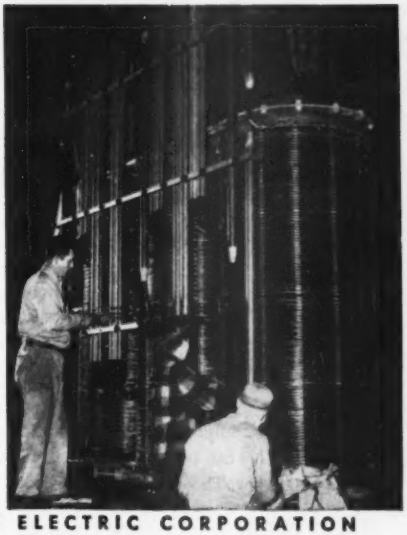


This oil-filled, forced-air cooled Wagner Power Transformer, rated 15000/20000 kva, is one of many installed at the Venice, Illinois plant of the Union Electric Company of Missouri.

Power Transformers
longer service life...







Wagner Power Transformers have been serving the power industry dependably for over sixty years. Service records from the field, dating back to the early days prove their ability to give continuous service over unusually long periods of time. They are compact in design and are built with painstaking care to give them inherent strength and stability. They have sufficient capacity to not only carry their normal load, but to be able to handle overloads—again and again—whenever emergencies arise.

Every step in the construction of Wagner Power Transformers is attentively controlled. Three steps are shown here. Highly skilled workers wind a low voltage coil, carefully place a high voltage stack into position, and make the final connections on a core and coil assembly.

Users of power transformers will find it profitable to consult Wagner engineers on their next transformer installation. Thirty-two branch offices, located in principal cities, are at your service. Bulletins TU-180 and TU-181 give information on the complete line of dependable Wagner Transformers.

Wagner Electric Corporation EST. 1891

WAGNER ELECTRIC CORPORATION
6456 Plymouth Avenue • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

type

CB*

construction

for longer power cable life

*carbon black construction (type CB) is the only *practical* method known for purifying and stabilizing the oil impregnate in power cable.

Type CB cables can be made with a resilient carbon black paper binder. This is a big improvement because it combines great strength with resiliency. The lead sheath is thereby relieved of strains due to bending and temperature rise.

And you can get CB with F-3** Arsenic-Lead Alloy Sheath. It does not age-harden and has the highest resistance to slow-bending fatigue, creep, vibration and internal pressure.

So it's Type CB with resilient binder and F-3 for power cable that lasts.

For technical details, ask your nearest Anaconda Sales Office, or write to Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 52416

the right cable for the job

ANACONDA® **wire and cable**

*CB—Carbon Black (U. S. Patent 2,102,129) Reg. U. S. Pat. Off. **F-3—Arsenic-Lead Alloy (U. S. Patents 2,300,788, 2,375,755 and 2,504,600) Reg. U. S. Pat. Off.

Adequate thermal capacity

FOR SHORT TIME HIGH CURRENTS

A BIG FEATURE OF THE R&IE TYPE "A" AIR SWITCH

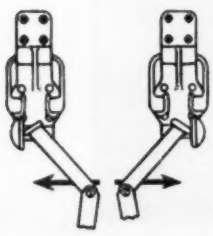
600 Ampere Blade and Jaw

1200 Ampere

"Because you demand your switches reliable"... that is why R&IE Hi-Pressure Contact Switches are fortified against operating hazards.

Check the Facts

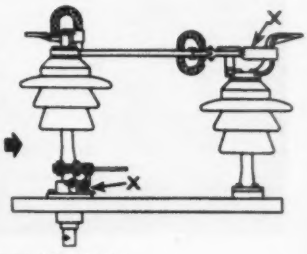
Electrical and thermal capacities have been substantially increased by the new Hi-Pressure Contact jaw design of the R&IE Type "A" Horn Gap Switch. These jaws now have silver-surfaced copper contact tips brazed to U-shaped beryllium copper jaw springs with provisions for 2 contact points on the 600 amp. switch jaws and 4 contact points on the 1200 amp. jaws. This use of copper and beryllium copper provides high conductivity, high strength and resiliency. In addition, jaws now have maximum mass back-up areas for heat absorbtion at the contacts.



Other Features...

Reversible blade and jaw permit clockwise or counter-clockwise operation—a sliding, wiping action that makes a new, clean surface with each contact operation.

Note how ice-locking troubles are lessened by the wide clearances (X) provided at jaw assembly and under the crank. Note, also, that terminals are located at the same level from base for straight-line bus connections.



R&IE EQUIPMENT DIVISION

I-T-E CIRCUIT BREAKER CO.

GREENSBURG, PA.

CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS

DISCONNECTING SWITCHES INDOOR AND OUTDOOR

HORN GAP SWITCHES

INTERRUPTER SWITCHES

CUTOUTS AND THERMO-RUPTERS

DISTRIBUTION EQUIPMENT

SWITCH OPERATING MECHANISMS

SUBSTATIONS

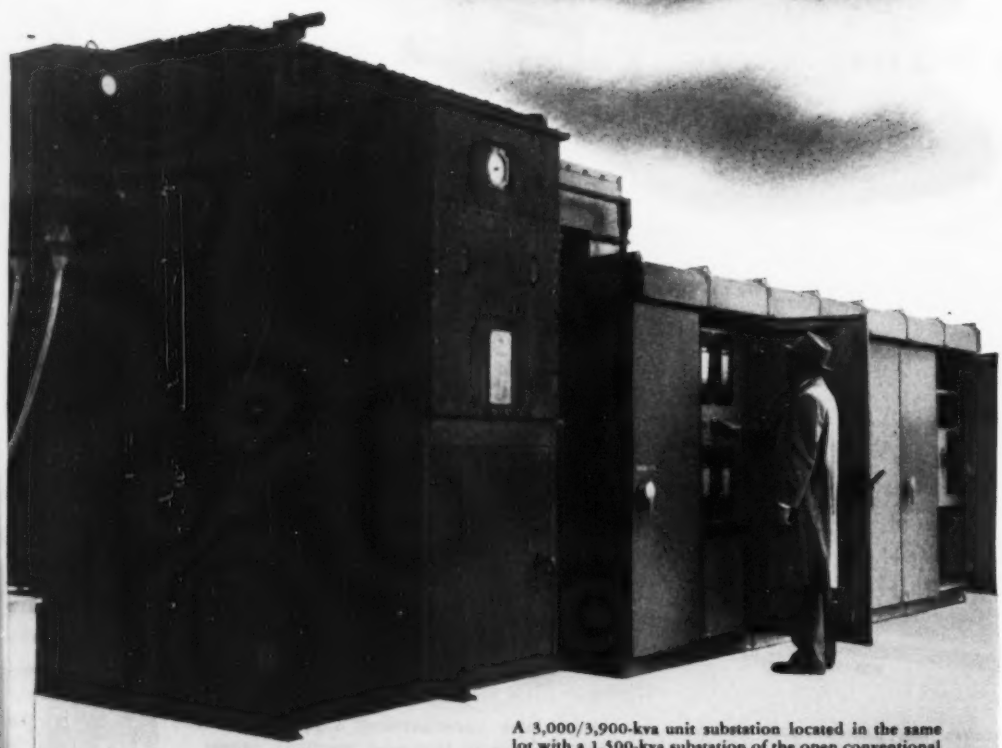
OPEN OR ENCLOSED ISOLATED PHASE HEAVY DUTY BUSES

KIRK INTERLOCK SYSTEMS

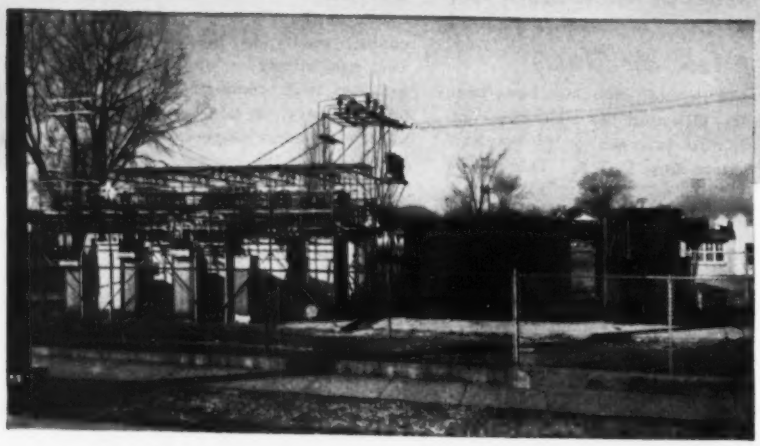
AUTOMATIC SWITCHING EQUIPMENT

METAL CUBICLES

TESTING DEVICES



A 3,000/3,900-kva unit substation located in the same lot with a 1,500-kva substation of the open conventional design. The open-type equipment was later removed.



Midwest utility modernizes system, solves load problem

WITH WESTINGHOUSE UNIT SUBSTATIONS

The experience of Iowa-Illinois Gas & Electric Company with unit-type substations will interest progressive system planners. It suggests a way to attain this important objective: *a simplified flexible system providing long-range operating economies.*

"Load growth in our area made it imperative for us to modernize our distribution system. After considerable study it was decided to use factory-built, unit-type substations.

"Westinghouse Unit Substations of co-ordinated unit design met our requirements . . . maintenance has been very slight . . . location of the substations close to the load center keeps losses to a low value and provides for better regulation. Future expansion is simply and economically handled by adding unit substations in areas of maximum load growth —or by moving a substation in its entirety, if load shifts, thereby salvaging the bulk of the investment."

Iowa-Illinois Gas & Electric enjoys these benefits because Westinghouse Unit Substations are specifically designed to meet today's power distribution problems. Unitized construction simplifies expansion to accommodate increased load requirements. Individual feeder regulation can often be eliminated and Westinghouse Unit Substations offer these same advantages to you.

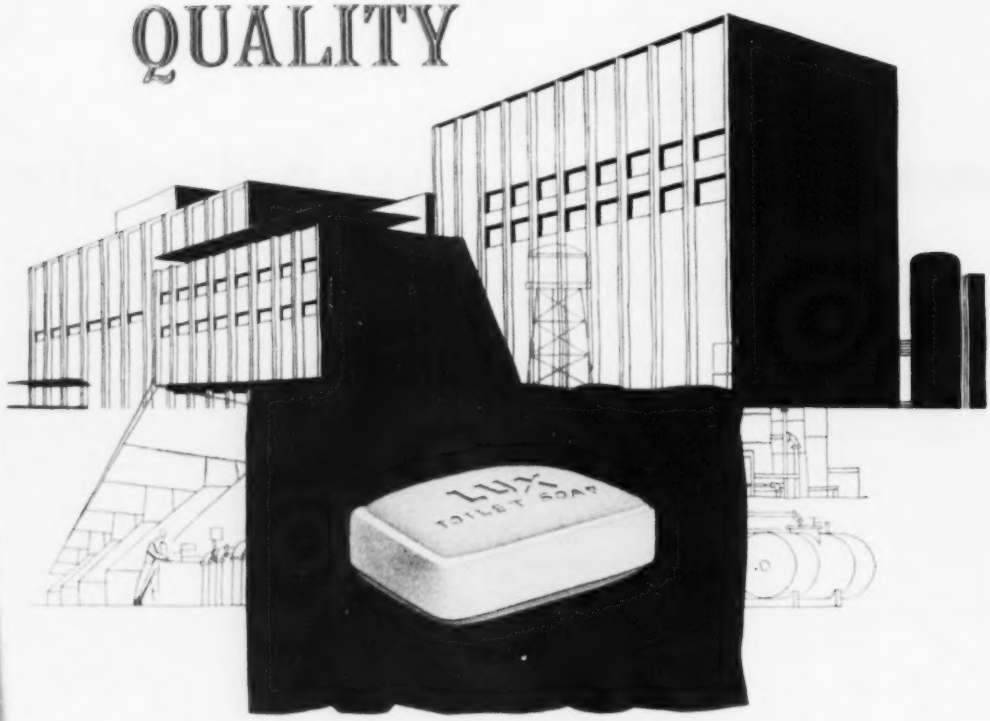
For complete information, get your copy of Booklet B-4061. Ask your Westinghouse Representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60779

YOU CAN BE SURE...IF IT'S Westinghouse

UNIT SUBSTATIONS

the Accent's on

QUALITY



...so Lever Brothers selected quality-controlled

SPANG CENTRAL CONDUIT

to protect electrical lifelines

In the most modern soap and shortening plant in the world—recently dedicated in Los Angeles County—the emphasis is on product quality, as in all Lever Brothers Company factories.

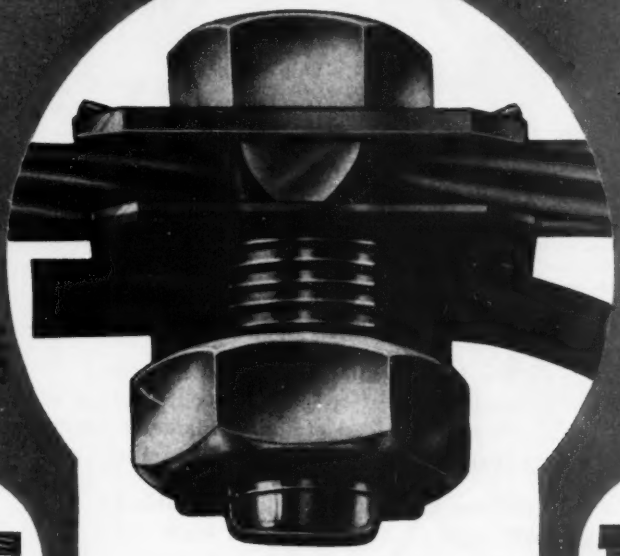
Every part, every machine, was selected with the greatest care to eliminate interruptions that might affect the exact, careful blending of raw materials. Electrical lifelines, for instance, are safeguarded by Spang "Cenlaco" Conduit—the conduit that's quality-controlled so it is always uniform in every way, always free from defects.

Wherever reliability is a must—easier, faster installation important—outstanding architects, contractors and owners specify conduit by Spang. Approved by the National Board of Fire Underwriters and complying with the National Electrical Code, it's *made better* for *better protection* of electrical circuits.

Owner:
Lever Brothers Company
Designers and Builders:
The Bechtel Corporation
Electrical Engineering:
The Bechtel Corporation
Consultant Architect:
Walton Becket and Associates

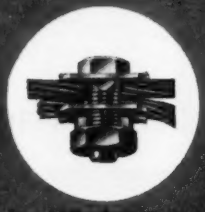
SPANG-CHALFANT
Division of The National Supply Company
GENERAL SALES OFFICE
GRANT BUILDING, PITTSBURGH 30, PA.
District Offices and Sales Representatives
in Principal Cities

The Answer to Your Aluminum Connection Problems!

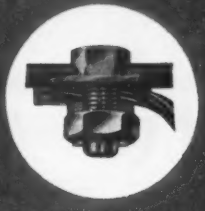


Type CA — For Al. line to Cu. tap or Cu. line to Al. tap. Al. bolt is cut with bi-metallic washer.

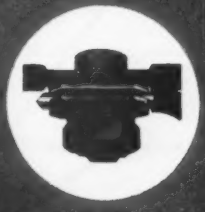
Type AA — For Al. to Al. All aluminum connector.



Type AA-B — Same as type AA with 2 Al. bi-metallic washers.



Type HPW — All plated universal connector for Cu. to Al., or Al. to Al. — Made of Bronze.



Type B-2-4 — Primarily for 4, 4 & 2 Al. tap to Cu. line — Bronze connector with 2 grooved bimetallic washers.

A Tried-and-Proved BLACKBURN Connector for Every Use!

Years of service in the field have definitely proved the dependability of BLACKBURN Connectors for aluminum and copper wires. Made of high-strength aluminum alloy, *Alumilite* treated for corrosion protection and non-freezing of threads — furnished with true bi-metal washers to separate dissimilar wires — these connectors are the answer to your aluminum connection problems. Write or phone for further information.

Jasper Blackburn CORPORATION

BLACKBURN *Hi-Strength* CONNECTORS

[illegible] Madison St., St. Louis 6, Mo.
Phone CEntral 3007

"By replacing ordinary fuses with Fusetron fuses

WE WIPED OUT NEEDLESS FUSE BLOWS

Mr. William Hartfel, Chief Electrician,
Trent Tube Mfg. Co., East Troy, Wisconsin
Division of Crucible Steel Co. of America

"We have a 1200 ampere switch with a grounded neutral on our 220 volt, 3 phase system. To handle the load of approximately 1000 amperes, we used two 600 ampere fuses in parallel.

"These fuses gave us a lot of trouble by blowing two or three times a week. Each blow meant a shutdown that caused a loss in production.

"In the early part of May, about two months ago, we decided to try out Fusetron dual-element fuses.

"These fuses completely wiped out needless fuse blows and what is more important they eliminated the costly interruptions of operating schedules."

Don't Risk Losses in Your Plant

One **needless** shutdown — One **lost** motor

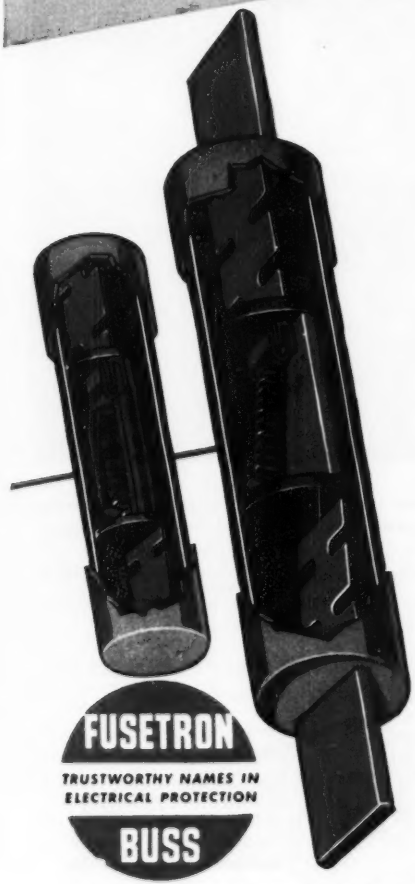
One **destroyed** panel or switch

One **burned out** solenoid

May cost you more than replacing every ordinary fuse with a FUSETRON dual-element Fuse.

But, simply knowing that FUSETRON fuses do save money is knowledge — but it isn't action.

By passing the word along that all purchase and stock records should call for FUSETRON dual-element fuses, you have action that begets money saving.



FUSETRON

TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION

BUSS

(Fusetron is a trade mark of the Bussmann Mfg. Co., Division of McGraw Electric Co.)

Fusetron DUAL ELEMENT Fuses

Provide NOT ONLY SHORT CIRCUIT *But* 10 Point Protection

1. Protect against short-circuits.*
2. Protect against needless blows caused by harmless overloads.
3. Protect against needless blows caused by excessive heating—lesser resistance results in much cooler operation.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect motors against burnout from overloading.
6. Protect motors against burnout due to single phasing.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Make protection of small motors simple and inexpensive.
9. Protect against waste of space and money — permit use of proper size switches and panels.
10. Protect coils, transformers and solenoids against burnout.

*Fusetron fuses have high interrupting capacity as shown by tests of the Electrical Testing Laboratories of New York City in December 1947.

Send the Coupon for more facts

Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo. (Division of McGraw Electric Co.)
Please send me complete facts about FUSETRON dual-element Fuses.

Name _____ Title _____

Company _____

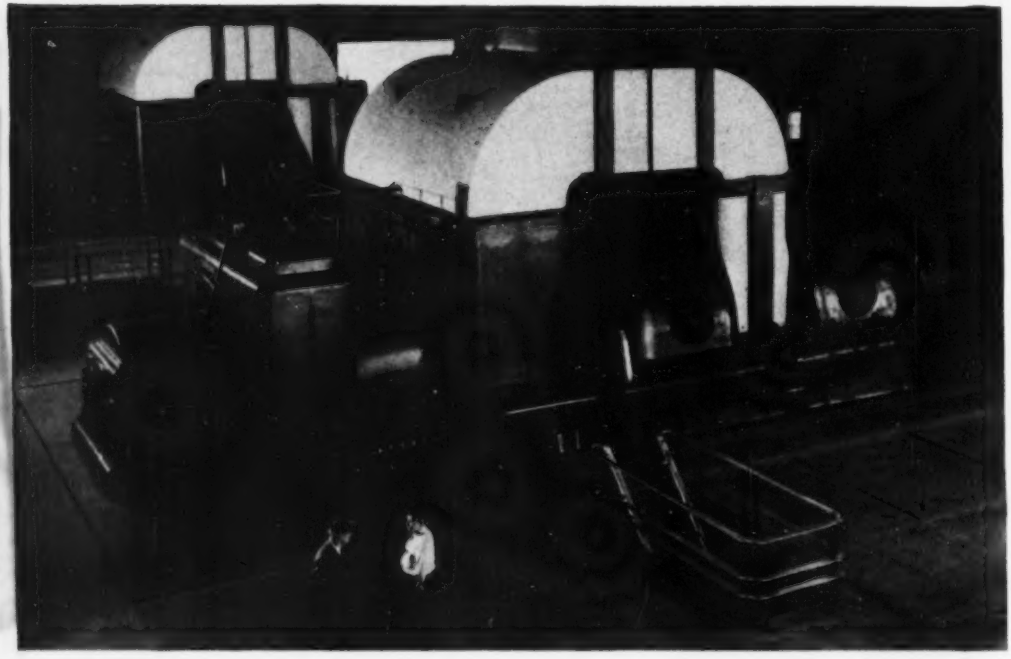
Address _____

City & Zone _____ State _____ 452

the One-Two for oxidation and deposits in turbine lubricating systems

1 Flush with GULF TURBINE FLUSHING OIL

2 Fill with GULFCREST OIL



By taking these two steps, you can insure top lubricating efficiency down through the years for your new steam turbine.

The use of Gulf Turbine Flushing Oil—before the initial fill of lubricating oil — will remove grease-type slushing compounds and carry away harmful abrasives which might be in the circulating system. And, it protects all oil-bathed surfaces against rust. Because Gulf Turbine Flushing Oil is itself a satisfactory lubricant, the undrained portion does not impair the lubricating value of the turbine oil.

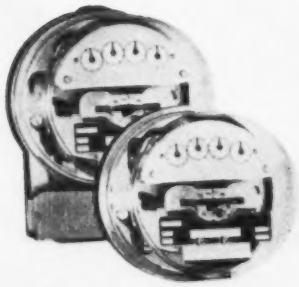
Then, to keep the new system clean, fill with Gulfcrest Oil. Because of its outstanding resistance to oxidation, Gulfcrest maintains an exceptionally low neutralization number, and lasts indefinitely. With this quality oil and good operating practice, you can be sure there will be no sludge deposits in cooler tubes, bearing pedestals, or oil lines to worry about.

To get these benefits for your new turbines, call in a Gulf Lubrication Engineer today. Write, wire, or phone your nearest Gulf office.

Gulf Oil Corporation · Gulf Refining Company
Pittsburgh 30, Pennsylvania.

GULF INDUSTRIAL LUBRICATION

current, potential and metering transformers



When accuracy is a factor

In the field of measurement for precision metering, operation of indicating instruments, relays and control apparatus, there is no substitute for accuracy.

The Standard Transformer Company has designed and is manufacturing a complete line of accurate current and potential transformers for every application... current, potential and metering transformers for any voltage up to and including 72 KV, and at any specified frequency. All thermal and mechanical ratings in accordance with industry's requirements and standards for each specific use. All standards set by ASA and EEI-NEMA in respect to accuracy are met.

Many prominent manufacturers of switchgear and control apparatus are regular users of STANDARD current and potential transformers. Our production facilities are flexible and engineering skill versatile enough to produce quickly transformers of special design to meet your specifications. Call in your STANDARD representative for further information.

everything points to

WRITE FOR BULLETIN S-501-B

32 pages of detailed drawings, accuracy limits, ratio and phase angle curves for current, potential and metering transformers. Write for your copy today.

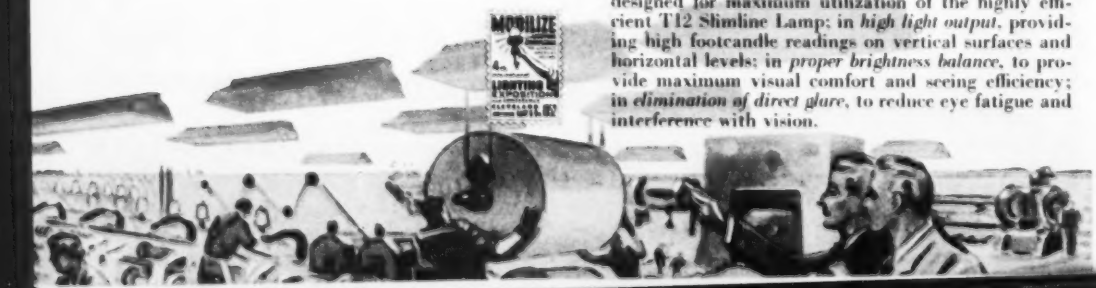
THE STANDARD TRANSFORMER COMPANY

WARREN, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES

by ANY Quality Standard

by all LIGHTING Standards . . . When compared with the most approved standards in the science of illumination, "Magna-Flo" systems excel: in *high lighting efficiency*, because these units are specifically designed for maximum utilization of the highly efficient T12 Slimline Lamp; in *high light output*, providing high footcandle readings on vertical surfaces and horizontal levels; in *proper brightness balance*, to provide maximum visual comfort and seeing efficiency; in *elimination of direct glare*, to reduce eye fatigue and interference with vision.



BENJAMIN "Magna-Flo" Excels!

Compare Benjamin "Magna-Flo" Industrial Lighting Systems with *all* established quality standards. You'll easily see why "Magna-Flo" units excel *all* ways! The "Magna-Flo" line is SO COMPLETE that over 300 combinations are possible from just 4 basic reflectors and 3 channels. This completeness makes possible TASK-MATCHED installations for the proper lighting of practically all types of industrial seeing tasks. In addition, "Magna-Flo" excels:

by all ELECTRICAL Standards . . . In "Magna-Flo" units you get equipment that meets the maximum established electrical standards to assure simplified installation, high efficiency and dependable operation. Top-of-channel knockouts provide handy line-wire entrances. Channel caps are easily fastened to the channel by two screws. For maximum efficiency and continuously-cool operation only high-power factor "ETL"-approved ballasts are standard equipment on "Magna-Flo" lighting units.

by all CONSTRUCTIONAL Standards . . . You'll find "Magna-Flo" excels in all ways to assure longer life and quicker, simplified maintenance. Reflecting surfaces are genuine "Life-Time" Porcelain Enamel, which does not discolor, scratch or become dull. Year after year, original light-reflecting efficiency can be sustained by simple soap-and-water cleaning. Further, "Magna-Flo" *excels because* ONLY "Magna-Flo" has "Springlox". This all-metal lampholder speeds up relamping, improves lighting equipment maintenance.

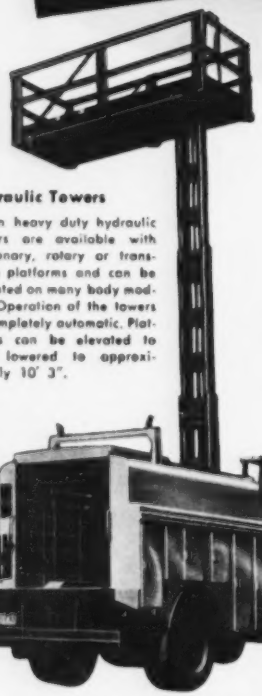
Write for Bulletin AD-5705, Benjamin Electric Mfg. Co., Dept. K Des Plaines, Ill.

for every type of utility work—

HOLAN Utility Bodies

• No matter how specialized your construction and maintenance work, a Holan utility body will meet your needs.

Today, more utility companies than ever before are demanding Holan bodies for two important reasons. First, the wide selection of standard body models often eliminates the need for more expensive special bodies. Second, Holan bodies have many extra features, included as standard equipment at no extra cost, that assure more efficient operation for your crew every working day.

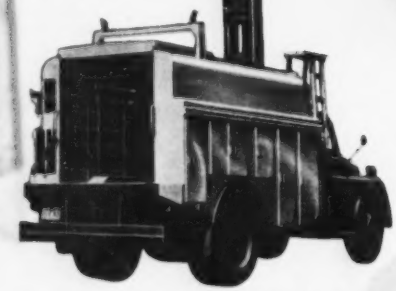


Hydraulic Towers

Holan heavy duty hydraulic towers are available with stationary, rotary or transverse platforms and can be mounted on many body models. Operation of the towers is completely automatic. Platforms can be elevated to 30', lowered to approximately 10' 3".

Line Construction Bodies

Holan construction and maintenance bodies can be mounted on any chassis with CA dimensions from 60" to 120". All models are available with or without crew compartments. Model CLC-138 is shown above.



General Service Bodies

Model 1090G is shown at right. Other models with open top, low roof enclosure or high roof enclosure are available for chassis with ½ ton to 1½ ton rating.

The dependable name in Utility Bodies . . .

J. H. HOLAN CORPORATION

BODIES and ACCESSORIES for UTILITIES

4100 West 150th Street Cleveland 11, Ohio

DISTRICT SALES REPRESENTATIVES

2754 N. 92 St. Milwaukee 10, Wis.

6-03 161 St. Beechhurst Queens, N. Y.

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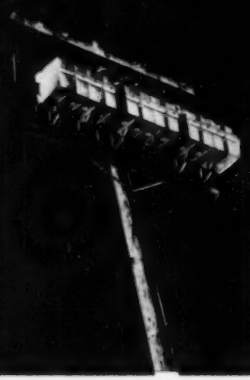
Baker Equipment Engineering Co. 2401 Hutchinson Avenue Charlotte, N. C.

Schatky Equipment Corp. 1810 S. E. 10th Avenue Portland 14, Oregon

LARGE SOUTHEASTERN SYSTEM *reports:*



FROM ITS C-D CAPACITORS

Called upon to supply enormous quantities of power to vital government plants, this utility is extremely "power-factor conscious." To date, C-D capacitors have delivered over 500 million Kvar hours of trouble-free service for this utility, under the most severe operating conditions! This outstanding field performance record is typical of more than 4,000 C-D power-factor installations made in the past decade.

a real test for capacitor dependability!

C-D installation shown is at the Southern Ferro Alloys plant. The large open type furnace (in background) runs well over 3000° F. This, plus the summer sun, corrosive fumes, etc. is a most severe test of the capacitor installation's ruggedness.

A C-D engineer will be glad to point out the many dollar-saving characteristics of C-D capacitors.
CORNELL-DUBILIER ELECTRIC CORP.
DEPARTMENT D 42-9
SOUTH PLAINFIELD, N. J.

CONSISTENTLY DEPENDABLE
CORNELL-DUBILIER CAPACITORS

PLANTS IN: SOUTH PLAINFIELD, N. J.; NEW BEDFORD, WORCESTER, CAMBRIDGE, MASS.; PROVIDENCE, R. I.; INDIANAPOLIS, IND.; FUQUAY SPRINGS, N. C. AND SUBSIDIARY, THE RADIART CORP., CLEVELAND, OHIO

Here's Proof of Performance

A MOVE, A FLOOD AND 37 YEARS OF SERVICE HAVEN'T AFFECTED THESE POLES —THEY'RE PROTECTED BY

CREOSOTE OIL

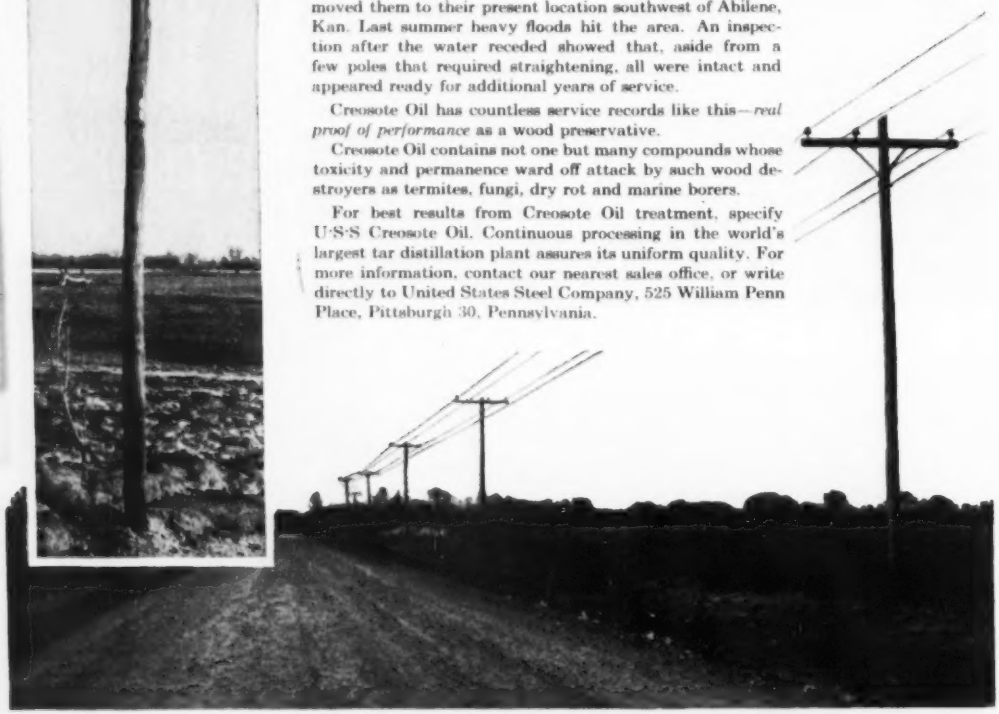
HERE'S ANOTHER EXAMPLE of the effectiveness of Creosote Oil as a wood preservative. In 1915 these southern pine poles were treated with Creosote Oil and installed near Gypsum, Kansas.

Fifteen years later, the owner, United Power & Light Corporation (now The Kansas Power and Light Company), moved them to their present location southwest of Abilene, Kan. Last summer heavy floods hit the area. An inspection after the water receded showed that, aside from a few poles that required straightening, all were intact and appeared ready for additional years of service.

Creosote Oil has countless service records like this—*real proof of performance* as a wood preservative.

Creosote Oil contains not one but many compounds whose toxicity and permanence ward off attack by such wood destroyers as termites, fungi, dry rot and marine borers.

For best results from Creosote Oil treatment, specify U·S·S Creosote Oil. Continuous processing in the world's largest tar distillation plant assures its uniform quality. For more information, contact our nearest sales office, or write directly to United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pennsylvania.



U·S·S CREOSOTE OIL

USS

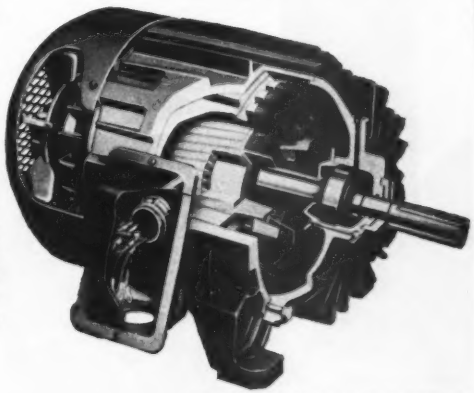
UNITED STATES STEEL

Totally-Enclosed Fan-Cooled MOTORS

Look Outside

Greatly increased radiating area means greater cooling efficiency. More important, cooling efficiency stays high, regardless of operating conditions. There are no enclosed external air passages to clog and cause overheating. If oily dirt sticks, just wipe or blow it off. No matter how bad operating conditions are, this motor can be easily kept clean and cool running. Electrical parts are protected against corrosive atmospheres by cast iron yokes and end housings.

Look Inside



Double-shielded, heavy-duty ball bearings require no maintenance in ordinary service under most conditions. However, they can be lubricated without disassembly if required. Double shielding prevents over-lubrication, leading cause of bearing trouble. Rotating seals, where shaft extends through housings, keep dirt and moisture out of bearing chambers. Die cast rotor and interphase insulation are further assurance of long life and low maintenance.

See *WHY THIS IS YOUR BEST MOTOR BUY*

HERE IS A MOTOR that is different from conventional TEFC motors; built with an entirely different cooling system that gives you big savings in lower maintenance, more continuous service and less trouble in the toughest locations. Clogging can easily be prevented in the Allis-Chalmers Type APZ TEFC motor since areas that might collect dirt are exposed and easy to clean.

GET DETAILS NOW — *Ask your nearby Allis-Chalmers Authorized Distributor or District Office for more complete information on this high performance TEFC motor. Or write direct to Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B7225.* A-3578

Texrope and Vari-Pitch are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

THE CONVENIENT, SAFE WAY TO PURIFY INSULATING OIL

Bringing a De Laval Insulating Oil Purifier to the transformer is the quickest, safest, most satisfactory means there is of dehydrating the oil. The De Laval machine centrifuges the oil dry in a single pass . . . no rerunning is necessary.

The De Laval method is safest because water once removed from the oil flows to waste, hence cannot recontaminate the oil. Action is both instantaneous and positive. With the De Laval Oil Purifier, there is never a chance that a batch of oil in process of being purified will go from a high to a low dielectric test in an instant.

● Write for Bulletin TR-1.

THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

DE LAVAL

INSULATING OIL PURIFIERS

strand is a controlled material

your steel allotment for guy strand will go 3 times as far with PLP GUY-GRIPS

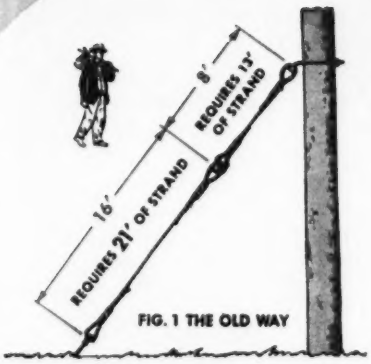


FIG. 1 THE OLD WAY

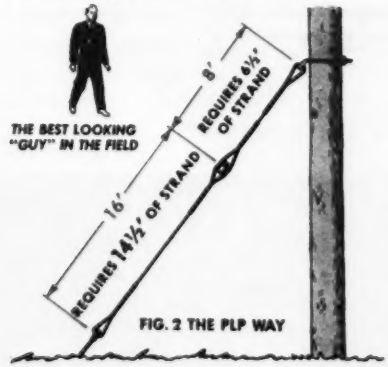


FIG. 2 THE PLP WAY

● With PLP GUY-GRIPS, you save critical guy strand and get stronger, safer guys. *For example,* let's consider the 24-foot, 6000# guy (Fig. 1). Doing the job in this conventional way, using Siemens-Martin Strand, requires:

13′ of ⅜″ strand (TS 6950#)
weighing 273#/1000′ = 3.549 lbs.

21′ of ⅜″ strand (TS 6950#)
weighing 273#/1000′ = 5.733 lbs.

9.282 lbs.

But the equivalent PLP Guy-Grip installation (Fig. 2) using 3-wire Extra-High Strength strand, requires only:

6½′ of ¼″ EHS strand (TS 6600#)
weighing 116.7#/1000′ = 0.759 lbs.

14½′ of ¼″ EHS strand (TS 6600#)
weighing 116.7#/1000′ = 1.692 lbs.

2.451 lbs.

SAVING --- 6.831 lbs.

Making this Guy the PLP way results in a saving of 73% of critical guy strand . . . and you eliminate the need of any clamps.

With PLP Guy-Grips, even wrenches are not needed. Simply install by hand! (Fig. 4). Any lineman . . . regardless of his skill . . . can do a perfect job every time. *Installation time is cut in half.*

Substantial dollar savings are the result even with "B" and "C" coated strand.

PLP Guy-Grips are available for strand sizes from 1/4″ through 1/2″.

FIG. 3—PLP Guy-Grips consist of Preformed Armor Rods preassembled in Guy-Grip sets.

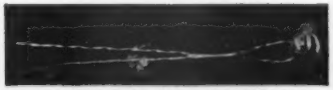


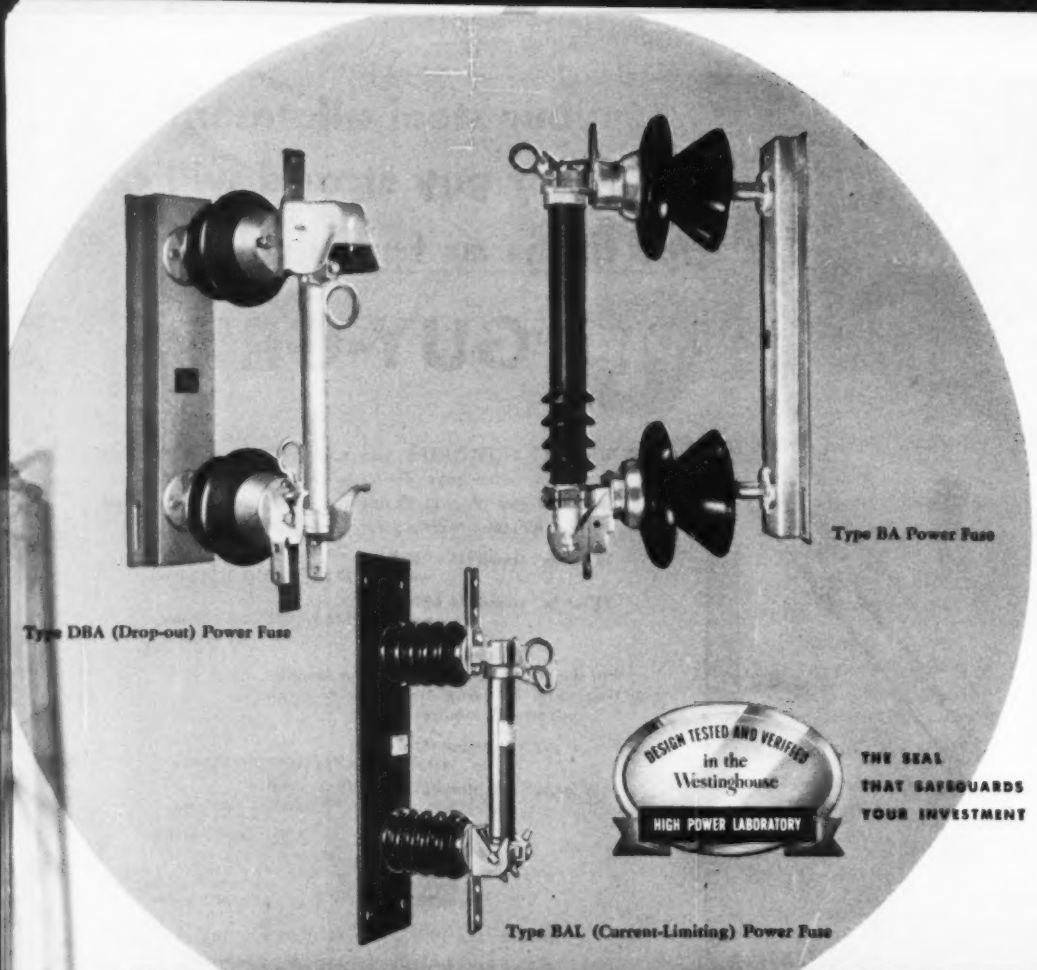
FIG. 4—To install, simply pass through guy-strain insulator or "through-bolt" and rotate ends around guy strand . . . by hand.

FIG. 5—PLP Guy-Grips assure the same tight gripping action as in the case of splices.

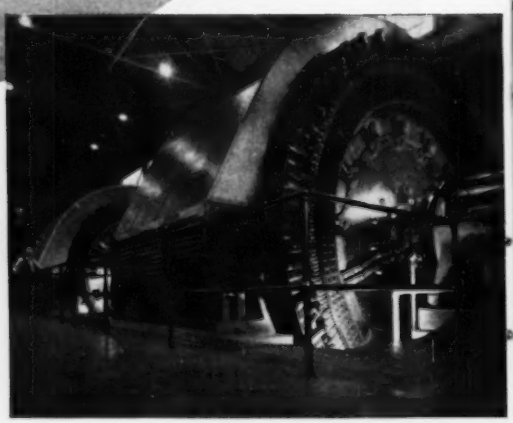
PREFORMED LINE PRODUCTS CO.

5349 ST. CLAIR AVE. • CLEVELAND 3, OHIO

Telephone: EXpress 1-3571



In a typical High Power Laboratory test, a Type DBA Fuse is shown interrupting the equivalent of a 3-phase, 1,000,000-kva fault. An instant after the photo was taken, the drop-out element operated, isolating the circuit.



Source of the laboratory's tremendous power are these two 60,000-kva generators. When paralleled, they are capable of delivering a 3-phase fault of 2,500,000 kva, or a single-phase fault equivalent to 4,000,000 kva.

ONLY *CONTROLLED* LABORATORY TESTING CAN PRODUCE THESE RESULTS:

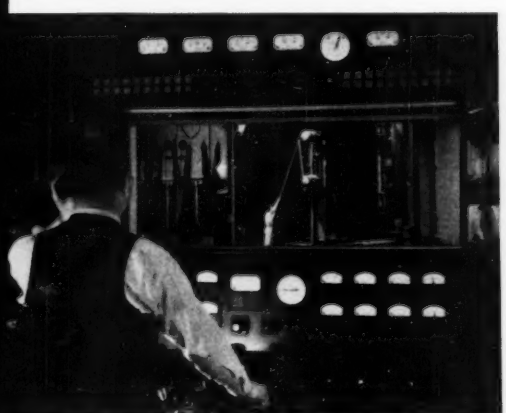
1. Application of Boric Acid Idea to Power Fuses

2. Proved Operation under all Circuit Conditions

In 1931, the Westinghouse High Power Laboratory—already five years old—played a major role in the development of the boric acid fuse. Conducting multiple tests under controlled conditions not available in the field, Westinghouse Laboratory technicians proved conclusively the soundness and superiority of the boric acid interrupting principle. The result is a complete line of low-cost protective devices proved to a degree unattainable by other means of testing. Considering the extent of your investment in fuse-protected equipment, this extra measure of sureness is an invaluable advantage. And it's one you get only when you specify Westinghouse.

Continued High Power Laboratory testing has also widened the application of this economical means of short-circuit protection. From the first Type BA Fuse, low-cost interrupting capacity has advanced with the development of Types DBA (drop-out) and BAL (current-limiting) until now 138,000-volt fuses that interrupt one million kva are available.

FOR COMPLETE INFORMATION on Westinghouse Power Fuses ask for a copy of Booklet B-5469. Contact your Westinghouse representative or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60781



From this control desk, a single operator guides all high power testing facilities. The control room also houses indicating instruments, protective relays, sequencing drums, and oscillographs which simultaneously record as many as eighteen variables.

See "Electrical Proving Ground"

...the dramatic story of the Westinghouse High Power Laboratory in sound and color motion picture. For details, see your Westinghouse Representative, or write: Westinghouse Film Division, Box 868, Pittsburgh 30, Pennsylvania.

YOU CAN BE SURE...IF IT'S

Westinghouse

POWER FUSES

EDISON selects NICHROME* V WIRE

for new, high-accuracy, long life MINIATURE RELAYS

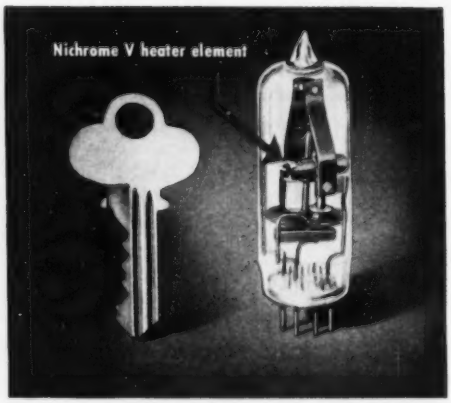
Edison's new space-saving miniature thermal time-delay relays, scarcely larger than a door key, are built to handle big jobs—accurately and dependably, day in and day out.

They offer the simplest, most trouble-free, and least expensive way of introducing delay periods into electric circuits. Thus they are ideal for control functions relating to cathode protection, motor starting, "hold-overs," overload protection, automatic cycling, and numerous applications where magnetic relays have hitherto been used.

Since accuracy of operation depends, essentially, upon the consistent performance of the extremely small heater, wire of this winding must be *exceptionally stable*—be capable of retaining its physical and electrical characteristics *indefinitely*.

Nichrome V alloy, unique product of Driver-Harris, fulfills these all-important conditions. With a temperature co-efficient of resistance that remains constant between 20°C. and 500°C.—a considerably wider temperature range than actually here involved Nichrome V assures uniform, precision performance. And being highly resistant to heat and corrosion, it assures *outstanding stability for a lifetime*.

This particular application serves to emphasize other desirable properties which make Nichrome V wire extremely suitable for heating, or resistance units required to occupy very limited space. For example: Only a few milliamperes of current are utilized by the Edison miniature thermal relay. The heater winding must, therefore, have high resistance in order to produce sufficient heat to deflect the bi-metal contact strip. The electrical resistivity of Nichrome V (650 ohms/cmf) permits a short length of one-mil-diameter wire to be used, thus saving space; and the high tensile strength of Nichrome V (200,000 p.s.i. at 20°C.) eliminates breakage in winding operation.



New Edison Time-Delay Relay — Model 207 Standard Voltages 115—27.5—6.32 Hermetically sealed. Vibration and shock proof. Ambient compensated −60°C. to +85°C. Wide range of delay periods available.

For products whose successful operation depends upon application of stable electrical alloys, highly resistant to heat and corrosion, you'll find Nichrome and Nichrome V offer *plus values* that are unequalled. At the present time, these alloys are on allocation; but if you will let us have your specifications, we shall be glad to make recommendations and serve you to the best of our ability.

Nichrome® is manufactured only by

Driver-Harris Company

HARRISON, NEW JERSEY

BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco

*T. M. Reg. U. S. Pat. Off.

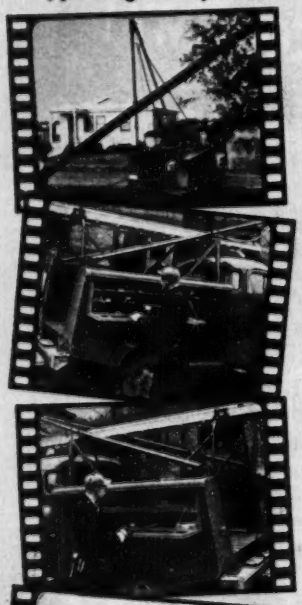
Sold in Canada by The B. GREENING WIRE COMPANY, LTD., Hamilton, Ontario, Canada

MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD

Action!

This Versatile Body is the STAR OF THE FIELD

A leading performer in supporting roles, too!



POWERS American

Series 350

LIGHT DUTY MAINTENANCE BODY

Utilities everywhere award the Series 350 an "Oscar" for efficiency. This versatile unit enables a two-man crew to perform maintenance and installation work normally requiring additional men and vehicles. The compact, fold-over derrick sets 40′ poles—a job which would otherwise require costly heavy-duty equipment. There's a 24′ ladder which can be quickly erected for overhead work. Compartments are equipped to carry tools and materials for many service operations. The under-floor winch is always ready to use—without moving material load. No wonder the Series 350 has been acclaimed "the most versatile performer in the field."

more utilities use POWERS-AMERICAN bodies than any other make

CLIP THIS COUPON and attach to your letterhead

McCABE-POWERS AUTO BODY COMPANY, 3901 N. Broadway, St. Louis 15, Mo.
Please forward details on SERIES 350. *Also send information on the following:*

- ☐ LINE CONSTRUCTION BODIES
- ☐ GENERAL SERVICE BODIES
- ☐ REVOLVING AERIAL LADDERS
- ☐ WIRE REELS
- ☐ POLE TRAILERS
- ☐ HYDRAULIC TOWERS
- ☐ _____
- ☐ _____
- ☐ _____

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

PHILCO

Advanced Design MICROWAVE

COMMUNICATIONS SYSTEMS

ENGINEERED FOR GREATEST ECONOMY!

Philco *Advanced Design* Microwave Systems are unsurpassed in reliability, performance and economy. They are designed to give you the greatest value for your communications dollar!

Finest quality components, conservatively rated, insure long life and economy of operation and maintenance. Years of production experience enable Philco to produce microwave systems for the lowest possible cost consistent with highest quality.

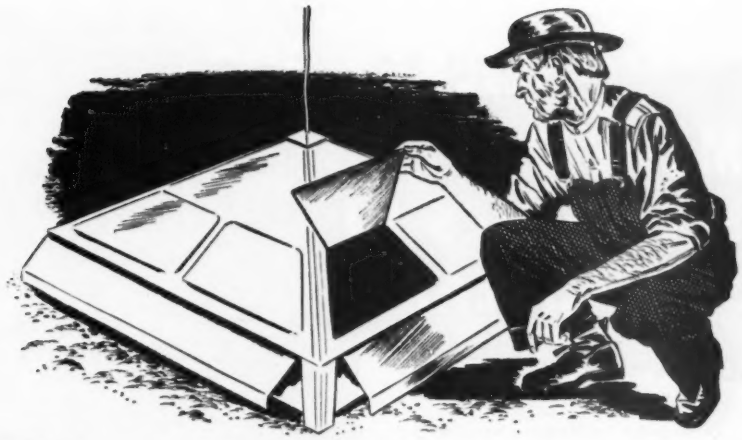
Philco *Advanced Design* Microwave is flexible. The broadband microwave channel may be divided to carry up to 24 simultaneous 2-way telephone conversations . . . or be further divided for telegraph, teletype, telemetering, signaling or supervisory circuits. Future expansion can be easily accomplished with no loss of original investment.

Philco *Advanced Design* Microwave Systems give you maximum reliability . . . plus *low cost* installation, operation and maintenance. *Don't settle for Less!*

PHILCO CORPORATION

INDUSTRIAL DIVISION

PHILADELPHIA 34, PENNSYLVANIA



GOING . . . GOING . . . Gone . . .

'Twas a balmy evening in March after one of those days when you are sure Spring is here — but know all too well it is still around the corner. As Eleazer Yoder crossed the yard, after putting his week-old turkey poults "to bed," he felt the wind change. Well — no need to worry. That new electric brooder would take care of any temperature change. Those poults were Eleazer's pride and joy. Were is right, for in the morning they were "all." During the night the temperature dropped, but the brooder didn't respond . . . the electrical insulation had failed. That particular manufacturer's name went down on Eleazer's black-list and sales in the area dropped sharply.

You can't afford to take chances on product breakdown and loss of customer good-will through inferior electrical insulation. Here's where BH Fiberglas can help you, with a sleeving or tubing for every electrical application.

There's BH Extra Flexible Fiberglas Sleeving for instance, a primary insulation for low voltages where heat resistance and flexibility are important. Made without hardening varnish or lacquer it is permanently flexible through a temperature range of −67°F. to 1200°F. Color stability to 300°F. BH Extra Flexible spreads to cover knobs, terminals, irregular objects, and through a patented process, plus an organic saturant, it will not fray or ravel.

As a supplementary insulation, BH Extra Flexible fully meets Underwriters' specifications. Permanently rounded, it handles easily – slips on quickly and is a definite time-saver over old-fashioned hand-wrapping methods.

BH Extra Flexible Fiberglas Sleeving is one of a family of electrical insulations, each designed to meet particular conditions in service. Give us a few facts about your requirements – product, temperatures, voltages – we will gladly send free samples for testing purposes.

Address Dept. W-4

Bentley, Harris Manufacturing Co.
Conshohocken, Pa.

BH *Fiberglas** **SLEEVINGS**

*BH Non Fraying Fiberglas Sleevings are made by an exclusive Bentley, Harris process (U. S. Pat. No. 2393530). "Fiberglas" is Reg. TM of Owens-Corning Fiberglas Corp.

MODERN ECONOMICS IN SWITCHGEAR

400 ampere 15000 volt metal enclosed Air Interrupter Switch. (Insulating barriers not shown.)

Three E Air Interrupter Switches are modern in design, compact, and easily installed. Real Savings are effected over use of previously accepted devices. Their interrupter units confine and extinguish the arc created by circuit interruption. In addition they provide for isolation of circuit and apparatus being switched.

Typical production of metal enclosed Air Interrupter Switches being made ready for shipment.

Typical applications are:

1. **Interrupt rated current at rated voltage.**
2. **Interrupt exciting current of transformers.**
3. **Interrupt charging current of lines and cables.**
4. **Sectionalize feeders.**

Three E Air Interrupter Switches are available for indoor service in voltage ratings of 7500 and 15000 and current ratings of 400 and 600 amperes (continuous and interrupting).

Write us for information as to how this up-to-date line can be applied to your switchgear requirements.

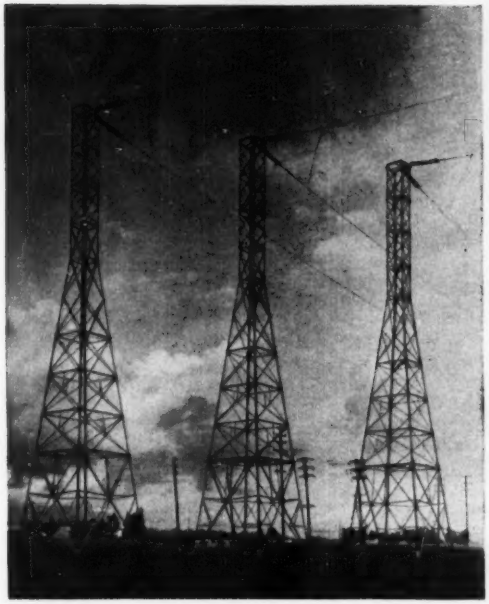
THREE E

ELECTRICAL ENGINEERS EQUIPMENT CO.

MELROSE PARK, ILLINOIS

Demand PROOF OF PERFORMANCE

for Superior Insulator Quality

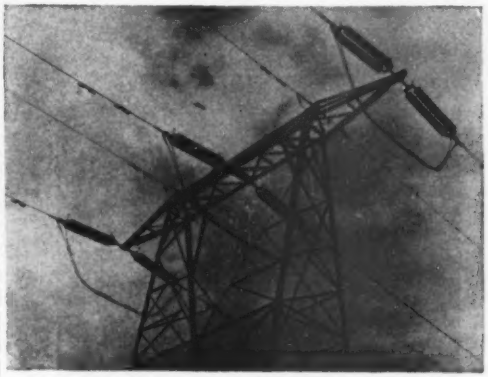


On right-angle towers, Thomas Insulators have the stamina that assures long life and trouble-free performance.

"Repeat Orders" are the best proof of insulator quality . . . and are the best evidence that all insulators are not alike.

Shown on this page are just two of the many Thomas insulator installations on the lines of one of the largest Western Utilities. For many years, this Customer has given us order after order. Such *repeat orders* from this and other companies are the best testimonials to the long life and outstanding performance of Thomas Insulators.

After all is said . . . it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE. Throughout the world, Thomas Insulators have been establishing service records since the advent of the Electrical Industry. Why gamble?



Thousands of Thomas Insulators make certain that this 220-kv line will give satisfactory service for decades to come.

The R. Thomas and Sons Company is a manufacturer and designer of all types of porcelain insulators . . . pin-type, switch, suspension, spools, guy-strain, bushings and special high-voltage porcelain. In addition, Thomas supplies associated line hardware, clamps, fittings, preformed armor rods, and so on.

SPECIFY THOMAS INSULATORS—THE BEST BY LINE TEST

— Since 1873 —

The R. Thomas and Sons Co.

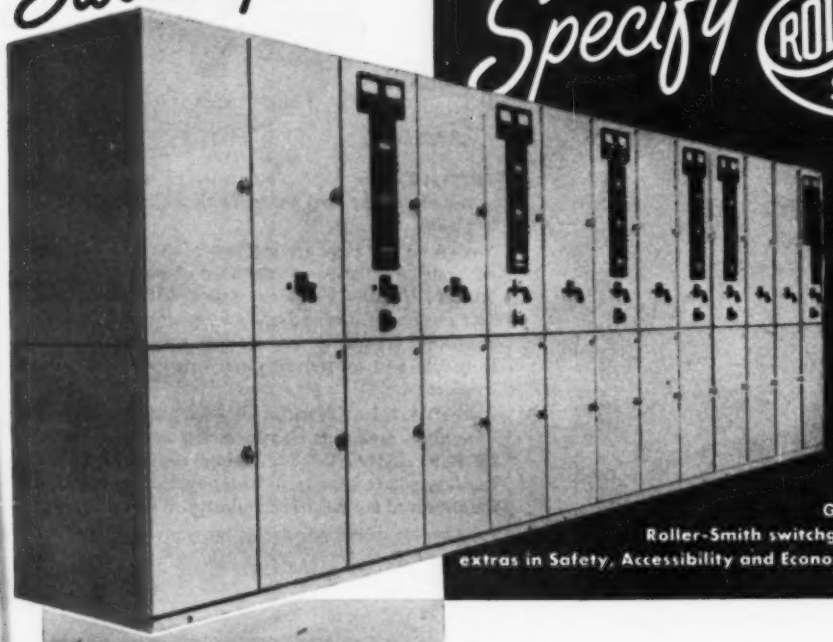
1873 THOMAS INSULATORS our 79th year RELIABILITY 1952

LISBON, OHIO

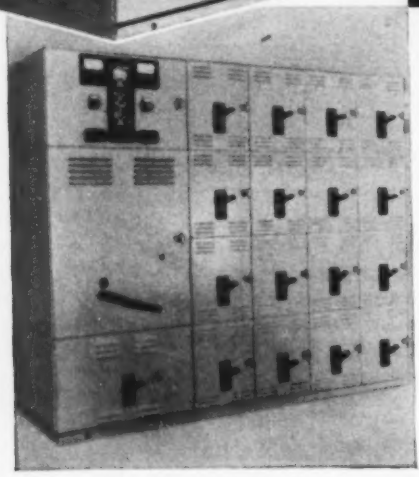
NEW YORK CHICAGO

Sales Representatives: **E. B. Anderson Co.,** *Detroit* • **Ken H. Best,** *Seattle* • **R. E. Cunningham & Son,** *Los Angeles* • **Engineer Sales Corp.,** *St. Petersburg* • **R. F. Hamilton & Associates,** *Denver* • **R. H. Harper,** *St. Louis* • **Geo. E. Hann Company,** *San Francisco* • **W. J. Hoge,** *Minneapolis* **Leiser & Company,** *Philadelphia* • **John G. Pettijohn Company,** *Knoxville* • **H. E. Ransford Co.,** *Pittsburgh* • **Redmond Supply Co.,** *Phoenix* **J. F. Schaefer & Co.,** *Kansas City* • **R. J. Sullivan & Company,** *Boston* • **Tafel Electric & Supply Co.,** *Louisville* • **Walter E. Thompson,** *Birmingham* **Triangle Electric Supply Company,** *El Paso* • **United Electric Supply Co.,** *Salt Lake City* • **Williamson Sales Co.,** *Shreveport, Amarillo, Dallas, Houston, New Orleans, Pine Bluff* • *Representatives in other principal cities*

in Switchgear... EXTRAS COUNT! Specify ROLLER SMITH



Get *all the extras*
Roller-Smith switchgear provides . . .
extras in Safety, Accessibility and Economy of operation.



● **SAFE** All equipment is metal enclosed . . . weather proofed when required . . . built to NEMA and AIEE standards for safe, dependable performance. The "up-to-the-minute" design of Roller-Smith switchgear assures *extra* safety for operators.

● **ACCESSIBLE** All sections of RS switchgear are easily accessible for quick inspection and adjustment. This cuts maintenance time to a minimum . . . makes it easier to do a thorough job.

● **ECONOMICAL** All Roller-Smith equipment is precision-built according to your specifications . . . tested *before* you get it. When you specify Roller-Smith, you can count on *extra* long, trouble-free operation with less "down time" for repairs.

Consult your nearest Roller-Smith representative, or write to us for catalogs which fully illustrate and describe our complete line of low voltage draw-out; moderate duty, vertical lift Metal Clad; and heavy duty Metal Clad switchgear.

ROLLER-SMITH CORPORATION
Bethlehem, Pennsylvania

ROLLER SMITH

WHY DO IT THE HARD WAY? . . . . by BUSTER

There's a CRESTOLOY WRENCH for EVERY JOB

Looks like Buster is playing "Eenie, Meenie" with his open end wrenches. On a great many jobs, he could save a lot of time if he had a couple of CRESTOLOY Wrenches handy. A flip of his thumb and he would have the right size without searching or fumbling. CRESTOLOY Wrenches are made a third thinner and twice as strong because they're forged of special steel. In sizes from 4 to 24 inches, single and double end styles. Almost 50 million sold to date. See your Hardware Dealer.

◀FREE BOOK!

Has all the answers. It tells what tools to use and how to use them. Fully illustrated. A postcard will bring it to you. Send today.

CRESCENT TOOLS
Give Wings to Work
®
Sign of the Artisan
Symbol of Excellence

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

Straight-from-the-shoulder facts show you save in every way with

CHEVROLET *Advance-Design* TRUCKS

FACT No. 1

COSTS LESS TO BUY

Match a Chevrolet truck against any comparable truck capable of handling the same payloads. You'll find Chevrolet trucks *list for less*, yet bring you ruggedness, stamina and great features not found in the other truck.

FACT No. 2

SAVES MONEY ON THE JOB

Experienced truck operators know Chevrolet trucks cost least to own and maintain. Valve-in-Head economy, in the Chevrolet Loadmaster or Thriftmaster engines, saves on gas. Four-way engine lubrication reduces wear and oil costs. Rugged construction means long life.

FACT No. 3

RIGHT TRUCK FOR EVERY LOAD

Chevrolet trucks are *factory-matched* to your payload and service requirements. You don't buy "too much truck" or "too little truck." Frame, axles, springs, body, brakes and power are *balanced* for the job.

FACT No. 4

KEEPS ITS VALUE LONGER

Records show that Chevrolet trucks traditionally bring more money at resale or trade-in than many other makes. Chevrolet's market value stays up because the value stays *in!* More proof that Chevrolet is the best truck buy! See your Chevrolet dealer soon.

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR—for smooth, quick acceleration response • DIAPHRAGM SPRING CLUTCH—for easy-action engagement • SYNCHRO-MESH TRANSMISSION—for fast, smooth shifting • HYPOID REAR AXLE—for dependability and long life • TORQUE-ACTION BRAKES—on light-duty models • PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES—on medium-duty models • TWIN-ACTION REAR BRAKES—on heavy-duty models • DUAL-SHOE PARKING BRAKE—for greater holding ability on heavy-duty models • CAB SEAT—with double-deck springs for complete riding comfort • VENTI-PANES—for improved cab ventilation • WIDE-BASE WHEELS—for increased tire mileage • BALL-TYPE STEERING—for easier handling • UNIT-DESIGNED BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.

CHEVROLET DIVISION OF GENERAL MOTORS, DETROIT 2, MICHIGAN

first in demand in value in sales

CHEVROLET

ALLIS-CHALMERS
INSTRUMENT TRANSFORMER

Accuracy Pays Off!
TWO WAYS

1 Assures correctness of customer's power bill

2 Helps determine power supplier's income

AS A METERING SUPERINTENDENT or purchaser of instrument transformers, you know the full importance of high quality equipment in power metering. You know, for example, that large errors in watthour and demand meter records could result from just a small error in your instrument transformer.

Accuracy in instrument transformers pays off for both the user and the supplier since it determines: (1) the amount of power for which your customer is billed, (2) the income to the supplier for that service.

ACCURACY MEETS ASA STANDARDS

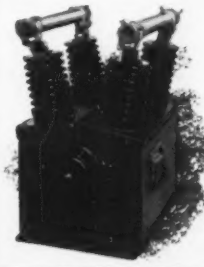
You get *accurate* metering with any Allis-Chalmers current or potential transformer or metering outfit. Each one is designed and built to meet ASA standards . . . and has the best combination of engineering and materials that 50 years of experience can provide.

New developments and technical improvements are being applied to many Allis-Chalmers instrument transformers. The new Type SPW potential transformer, for example, is smaller, lighter and more compact. As a step toward longer life, the coils are corona-protected. The hermetically sealed, all-welded tank protects insulation and oil from sludge formation.

Contact your nearby Allis-Chalmers district office for details on any instrument transformer in this wide line. Or write Allis-Chalmers, Milwaukee 1, Wisconsin for bulletin 61B7168. A-3629

Outdoor potential transformer for heavy duty metering service, Type SPW. Ratings up to 69 kv. Compact, lightweight design. Also available in single bushing design for line to ground connection.

Outdoor current transformer for heavy duty metering, Type KO. Ratings up to 15 kv and 800 amperes. Solid compound guards windings and insulation from air and moisture. Mounts in any position, horizontally or vertically.

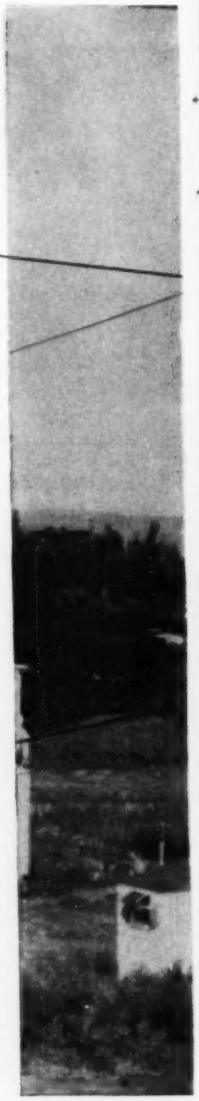


Indoor potential transformer, 500 va fused or unfused, Type JD. Ratings up to 14,400 volts. High thermal capacity. Compound filled under vacuum . . . eliminates air and moisture and extends insulation life.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Pole in splinters ...service intact!



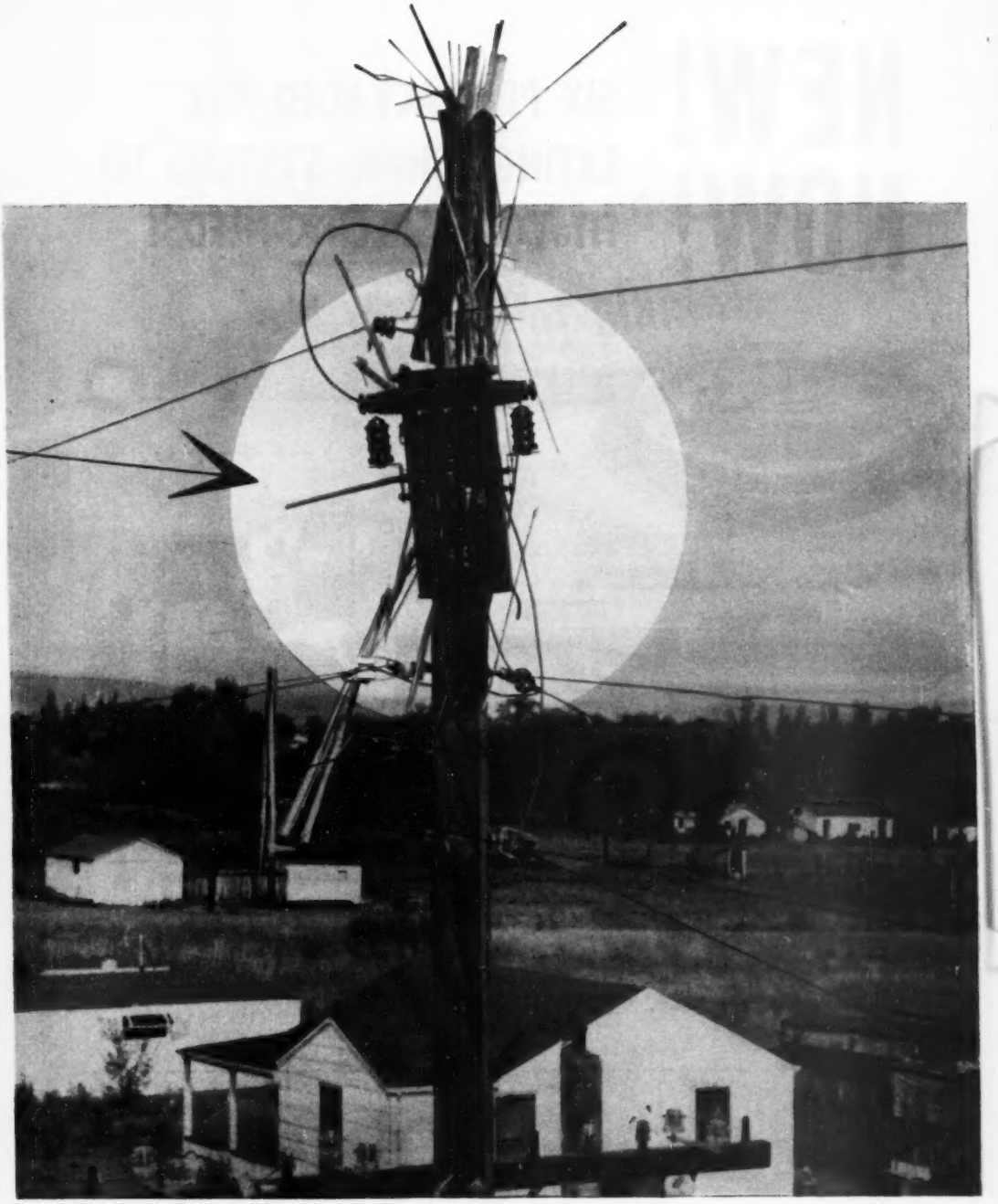
On Loretto Heights Hill, near Englewood, on the Colorado Central Power Company system, this Westinghouse "CSP®" Distribution Transformer took a direct stroke of lightning early in the evening, yet maintained service with no interruption throughout the night!

The following day, when a new pole was installed, the transformer was found to be completely unharmed, although the ground lead from the tank discharge gap was burned off. The unit was therefore again hooked up for service.

Westinghouse "CSP" (Completely Self-Protecting) Transformers, because *all* parts are factory co-ordinated, provide better protection against lightning, surges, short circuits, and overloads, giving assurance of service continuity. Your Westinghouse Representative will be glad to show you actual figures which explain why Westinghouse "CSP" Transformers offer bigger savings in installation and maintenance costs. Call him today. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70616

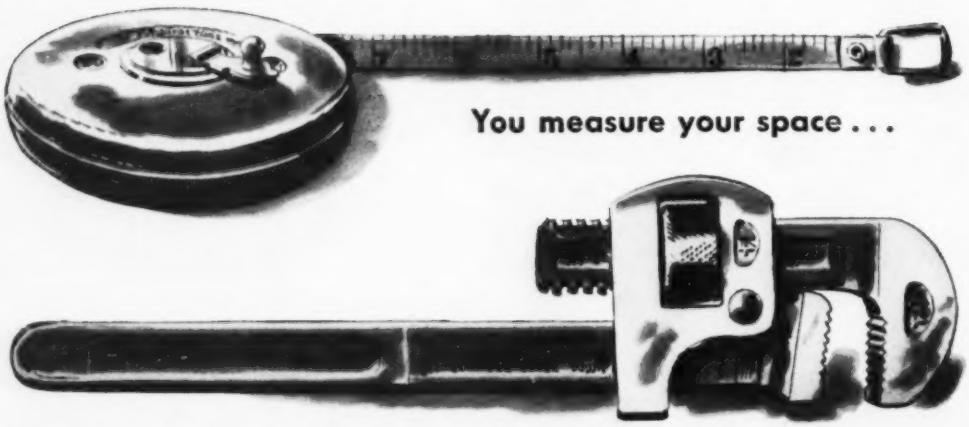
"CSP" devices . . . originated and patented by Westinghouse

YOU CAN BE SURE... IF IT'S
Westinghouse
"CSP" DISTRIBUTION TRANSFORMERS



NEW! NOW!

SIX PRE-PACKAGED FIRE EXTINGUISHING SYSTEMS TO FIT YOUR SPECIFIC NEEDS!



You measure your space . . .

anybody who can cut pipe can install them

Here is the answer to inexpensive built-in fire protection against flammable liquid and similar industrial hazards.

The new Kidde Standard Pak is a ready-made, pre-engineered fire extinguishing "package" for volumes up to 6,000 cubic feet. Anyone who can cut pipe can install it. Each kit contains dependable Kidde rate-of-rise heat detectors, efficient Kidde Multi-jet nozzles, and automatic discharge heads. Paks are supplied with or without pipe and fittings. Optional accessories include pressure trips and switches, remote controls, sirens, gongs.

A choice of six sizes assures you of the right package for your particular requirements. For complete information send us coupon below.

Please send me details on the New Kidde Packaged Fire Extinguishing System

NAME _____

FIRM NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Kidde

Walter Kidde & Company, Inc.

430 Main Street, Belleville 9, N. J.

Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

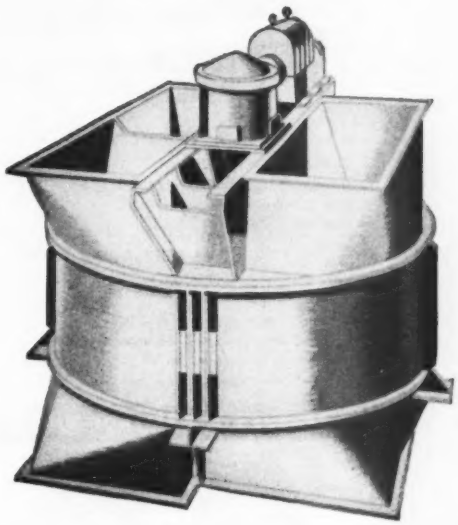
fuel costs of plants!

The Ljungstrom operates on the continuous regenerative counterflow principle. The heat transfer surfaces in the rotor act as heat accumulators. As the rotor revolves the heat is transferred from the waste gases to the incoming cold air.

The Ljungstrom air preheater has proved its value in industrial and utility plants throughout the country. That is why every year a constantly increasing percentage of the installed boiler capacity is equipped with Ljungstrom air preheaters.

Your fuel costs will be lower too, when your boiler is equipped with the Ljungstrom air preheater. The regenerative design of the Ljungstrom permits reliable operation at low exit gas temperatures. This assures the greatest possible heat recovery . . . reduces the amount of fuel required.

If you are planning a new installation, or expanding your present one, our engineers will welcome the opportunity to show you how the Ljungstrom air **preheater can raise the overall** efficiency of *your* plant.



THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

THE NEW TYPE STS TRANSOCKET
• Contains integral transformers
• Handles heavy loads—up to 400 amperes
• Cuts installation costs
• Compact design—saves space
THE TYPE STU, HEAVY-DUTY METER SOCKET
• Takes standard S-type meters
• Takes up to No. 0000 cable
• Utilizes full inherent capacity of 50-amp meters
• Has removable jaws and terminal assembly
• Compact design—saves space
• Fully automatic circuit closing device
THERE'S A WESTINGHOUSE METER FOR EVERY APPLICATION!
Single-phase watthour meter
Combination polyphase watthour and thermal demand meter
Combination single-phase watthour and thermal demand meter
Polyphase meter with block interval demand register

Two New Ways
to cut metering costs on heavy loads

Here's a pair of Westinghouse "firsts" designed specifically to cut your metering costs—the STU High Capacity Socket and the new STS Transocket, with integral transformer.

Both sockets are ideal for heavy current applications where it was formerly necessary to devise special metering facilities. They install easily . . . inexpensively . . . and take standard meters. For electric house heating, outdoor pumping installations and many large commercial loads, their cost-cutting characteristics promise important new savings. And these new units are only part of . . .

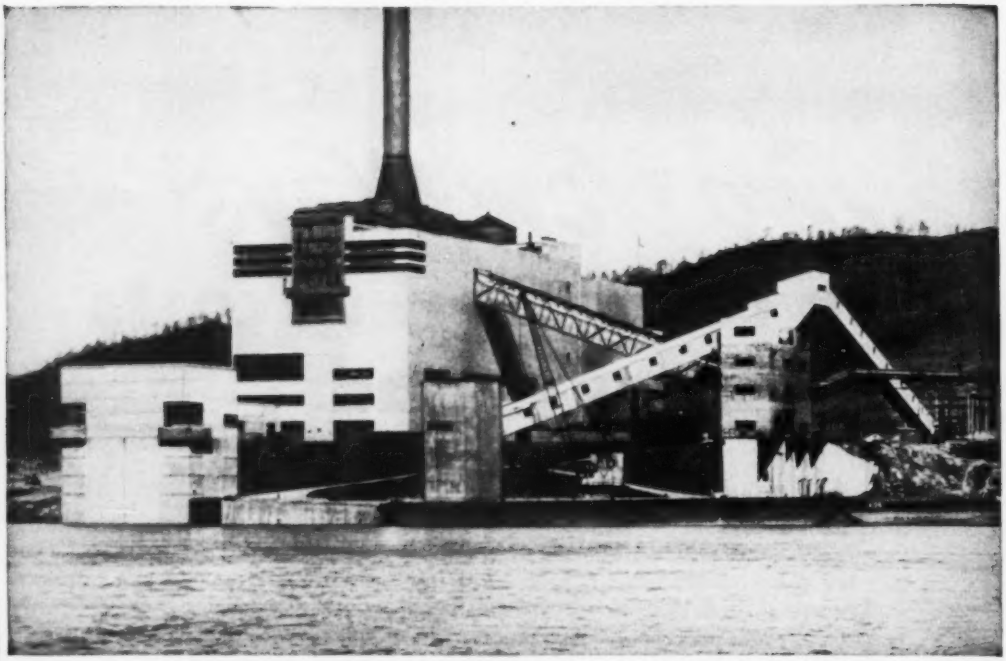
A complete line of metering equipment . . . one that meets all of your present needs . . . and anticipates many of your future requirements!

In the complete line of Westinghouse Metering Equipment you'll find many opportunities for savings. So whether your needs involve metering large loads or small, single or polyphase circuits, kw or kva, Westinghouse is a good place to go.

For complete information on High Capacity Sockets, write for Bulletin CS-42-810. Address: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-40396

YOU CAN BE SURE... IF IT'S
Westinghouse
METERS



Unique Circulating Water System Installed in This Power Plant

The R. E. Burger steam-electric plant of Ohio Edison Company is located on the Ohio River well above flood stage—which may reach as much as 60 feet above extreme low water. Water is supplied to the condensers by a patented circulating water system pioneered jointly by Worthington and the consulting engineer, Mr. George W. Saathoff.

All major equipment except circulating pumps, which are designed to operate completely submerged if necessary, are located above flood stage.

The new installation of a Worthington 70,000 sq ft two-pass condenser and auxiliaries, serving a 90,000 kw turbine-generator, is the third Worthington unit in this station. Two 46,000 sq ft condensers were previously installed.

For advice on any new installation or information on a wide range of power plant equipment, consult Worthington Pump and Machinery Corporation, Steam Power Division, Harrison, New Jersey.

HOW IT WORKS

Two full-capacity circulating pumps are used in series.* The primary pump, submerged below extreme low water, is a Worthington motor-driven HIFLO. Its high starting head characteristic is able to deliver enough water for starting purposes. A booster pump—a single-suction volute Worthington MIXFLO, mounted directly upon an hydraulic turbine—starts when there is enough water in the control well. The two pumps then operate automatically in series at full capacity.

Advantage is taken of maximum siphon effect from the condenser drop leg which enters the sealing or control well. From this well, all circulating water is passed through the hydraulic turbine. Thus the static head from sealing well to river level is utilized—75-80% being recovered—in reducing the work of the primary pump, with saving in overall pumping power.

The booster pump functions until rising water renders the turbine ineffective. Then the primary HIFLO works alone, producing full capacity under reduced head.

*In the new unit, there are two half-capacity primary pumps, permitting operation of only one in the winter when low water temperatures prevail.

Z1.1

WORTHINGTON

WORLD'S BROADEST LINE OF STEAM POWER PLANT AUXILIARIES

Feed Water Heaters	Boiler Feed Pumps	Steam Turbines
Steam-Jet Ejectors	Water Treating Equipment	Surface Condensers

YOU GET 4 EXCLUSIVE ADVANTAGES WHEN YOU SPECIFY

FLEUR·O·LIER

1 Only Fleur-O-Lier fixtures are rated on the Fleur-O-Lier Index Rating System. This gives illuminating characteristics, shielding, brightness, etc., for each fixture.

2 Complete photometric test data including distribution curves and coefficients of utilization tables are computed by Electrical Testing Laboratories, Inc., and are provided for every Fleur-O-Lier luminaire.

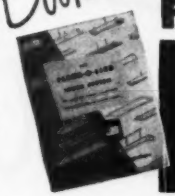
3 Fleur-O-Lier fixtures are certified by Electrical Testing Laboratories, Inc., as complying with rigid specifications covering electrical and mechanical construction.

4 More than 300 different Fleur-O-Lier fixtures made by nearly 30 manufacturers give you a wide selection from which to choose.

THESE 4 ADVANTAGES ASSURE *Lighting Satisfaction* WHEN YOU SPECIFY FLEUR-O-LIER

Free Booklet

Write for your free copy of the new booklet giving complete details of the Fleur-O-Lier Index System.



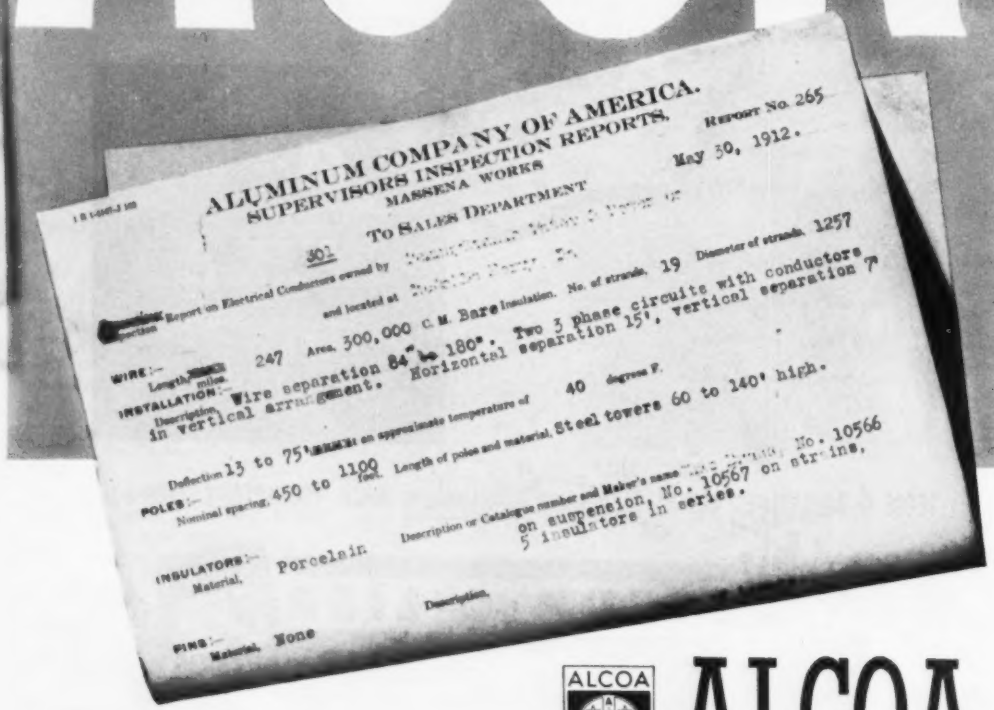
FLEUR·O·LIER

Manufacturers

2116 Keith Building • Cleveland 15, Ohio

Fleur-O-Lier is not the name of an individual manufacturer but of a group of fixtures made by leading manufacturers. Participation in the Fleur-O-Lier program is open to any manufacturer who complies with the Fleur-O-Lier requirements.

ACSR



ALUMINUM COMPANY OF AMERICA.
SUPERVISORS INSPECTION REPORTS.
MASSENA WORKS
Report No. 265
To SALES DEPARTMENT
May 30, 1912.

301

Report on Electrical Conductors owned by [redacted] and located at [redacted]

WIRE:— Length [redacted] miles. 247 Area. 300,000 C.M. Bare Insulation. No. of strands. 19 Diameter of strands. 1257

INSTALLATION:— Description. Wire separation 84" to 180". Two 3 phase circuits with conductors in vertical arrangement. Horizontal separation 15', vertical separation 7'

Deflection 13 to 75' [redacted] on approximate temperature of 40 degrees F.

POLES:— Nominal spacing, 450 to 1100 feet. Length of poles and material. Steel towers 60 to 140' high.

INSULATORS:— Material. Porcelain. Description or Catalogue number and Maker's name [redacted] No. 10566 on suspension, No. 10567 on strains. 5 insulators in series.

PINS:— Material. None Description.

ALCOA

ALCOA

and Alcoa Experience

Shown here is an Alcoa field service report dated May 30, 1912. It's one of several made on a line that's still in service. In the forty years since the report was written, we've been adding constantly to our firsthand knowledge and on-the-job experience by cooperating with our customers in the field.

Alcoa entered the aluminum conductor business over 55 years ago. We've been in it...leading the field...ever since. Those years of high line experience on thousands of successful jobs, the reports of Alcoa experts who have helped string lines throughout the country, have been incorporated into Alcoa's manufacturing techniques.

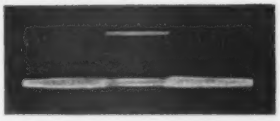
That's why you get the highest quality wire and cable, aluminum or ACSR, from Alcoa. Cable with uniformly correct stranding . . . a galvanized steel core that meets ASTM specs. Quality features built into the product by careful Alcoa workmanship, checked by rigid Alcoa inspection, backed by half a century of Alcoa experience.

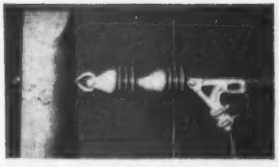
Look to Alcoa for your aluminum wire and cable... and buy with assurance!

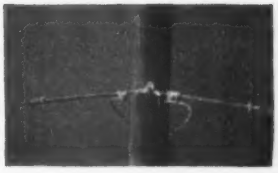
ALUMINUM COMPANY OF AMERICA
2100-D Gulf Building • Pittsburgh 19, Pennsylvania

ALCOA ACCESSORIES

Alcoa offers a complete line of job-proved accessories for aluminum cable and ACSR.







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FIRST IN ALUMINUM
FIRST IN A·C·S·R

Electrons probe the future

1 Electron micrograph of an alloy of aluminum, nickel, cobalt and iron. Magnification 20,000 diameters.

2 Cooled from high temperature in a magnetic field, the alloy becomes a powerful, permanent magnet. Note changed structure. Black bars reveal formation of precipitate parallel to the applied field. Each bar is a permanent magnet.

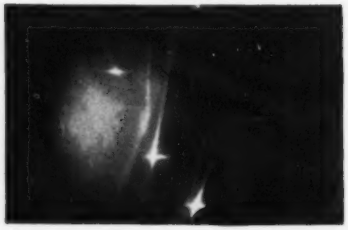
3 A Bell scientist adjusts electron diffraction camera. Electrons are projected on the specimen at glancing angles. They rebound in patterns which tell the arrangement of the atoms . . . help show how telephone materials can be improved.

In 1927, Bell Laboratories physicists demonstrated that moving electrons behave like light waves, and thus launched the new science of electron optics.

Now, through the electron beams of the electron microscope and electron diffraction camera, scientists learn crucial details about the properties of metals far beyond the reach of optical microscopes or chemical analysis.

At the Laboratories, electron beams have revealed the minute formations which produce the vigor of the permanent magnets used in telephone ringers and magnetron tubes for radar. The same techniques help show what makes an alloy hard, a cathode emit more electrons and how germanium must be processed to make good Transistors.

This is the kind of research which digs deep *inside* materials to discover how they can be made better for your telephone system . . . and for the many devices which the Laboratories are now developing for national defense.



4 Diffraction pattern of polished germanium reveals minute impurities which would degrade the performance of a Transistor.

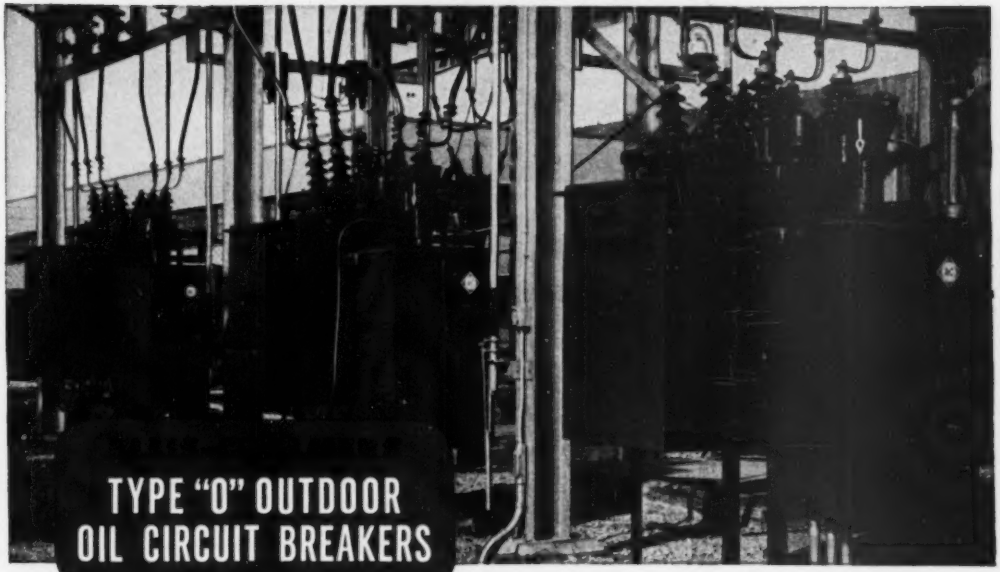
BELL TELEPHONE LABORATORIES

Improving telephone service for America provides careers for creative men in scientific and technical fields.

Dependable

ELECTRICAL PROTECTION

FOR DISTRIBUTION SYSTEMS



Packaged complete for improved automatic reclosing service

ALL YOU NEED to order your type "O" breaker is one set of specifications. It's simple and convenient. This standard 3-pole breaker comes to you mounted on a strong lightweight framework with operating mechanism and automatic reclosing equipment each in its own weatherproof housing. The type "O" breaker is factory assembled, wired and tested in accordance with ASA standards . . . ready to install and operate.

SECURE THESE PROVEN ADVANTAGES

1. **Positive, high speed breaker action with mechanically and electrically trip-free solenoid operating mechanism, ac or dc operation as specified.**
2. **Efficient circuit interruption with high rate of dielectric recovery for low contact and oil deterioration.**
3. **Automatic reclosing duty for unattended stations with standard protective and reclosing relay equipment included.**

Feature for feature you cannot buy better breakers in this class. Over 50 years of Allis-Chalmers progress in power circuit breakers is built into them. You can install them with complete confidence. For more information call your local A-C sales office or write Allis-Chalmers, Milwaukee 1, Wisconsin, for bulletins 71B6165A (OX-18) or 71B6093C (OZ-110, OZ-210).

A-3440

Type	Rated KV	Rated Amps. (60 cycle)	Interrupting Capacity KVA
OX-18	7.2	600	50,000
OZ-110	14.4	600	100,000
OZ-210	14.4	600	250,000
OZ-210	14.4	1200	250,000
OZ-210	23	600	250,000

ALLIS-CHALMERS

DESIGNED TO MEET YOUR NEEDS BETTER . . . AND MORE ECONOMICALLY!

The Moloney HiperCore CSP Transformer with wound cores of cold-rolled silicon steel combines superior operating characteristics with low maintenance costs. Operating records show the better voltage regulation and greater short-time overload capacity of the HiperCore Transformer.

The CSP equipment contributes to the low maintenance costs on these transformers. Not only are they protected against lightning surges and short circuits, but also against overloads which tend to shorten the life of a transformer.

CSP equipment consists of the following: Lightning arresters, primary fuses, tank grounding gaps (on tanks not solidly grounded), and secondary circuit breaker with indicating light (to indicate overload).

Simplicity of design of the core-and-coil unit plus liberal use of materials and adequate cooling ducts make HiperCore Transformers cooler operating and better performing, resulting in longer life under normal operating conditions.

CHECK THESE FEATURES of all HIPERCORE TRANSFORMERS

- ✓ **Excellent voltage regulation**
- ✓ **High short-time overload capacity**
- ✓ **Light weight**
- ✓ **Small size**
- ✓ **Long operating life**
- ✓ **Low temperature gradient**

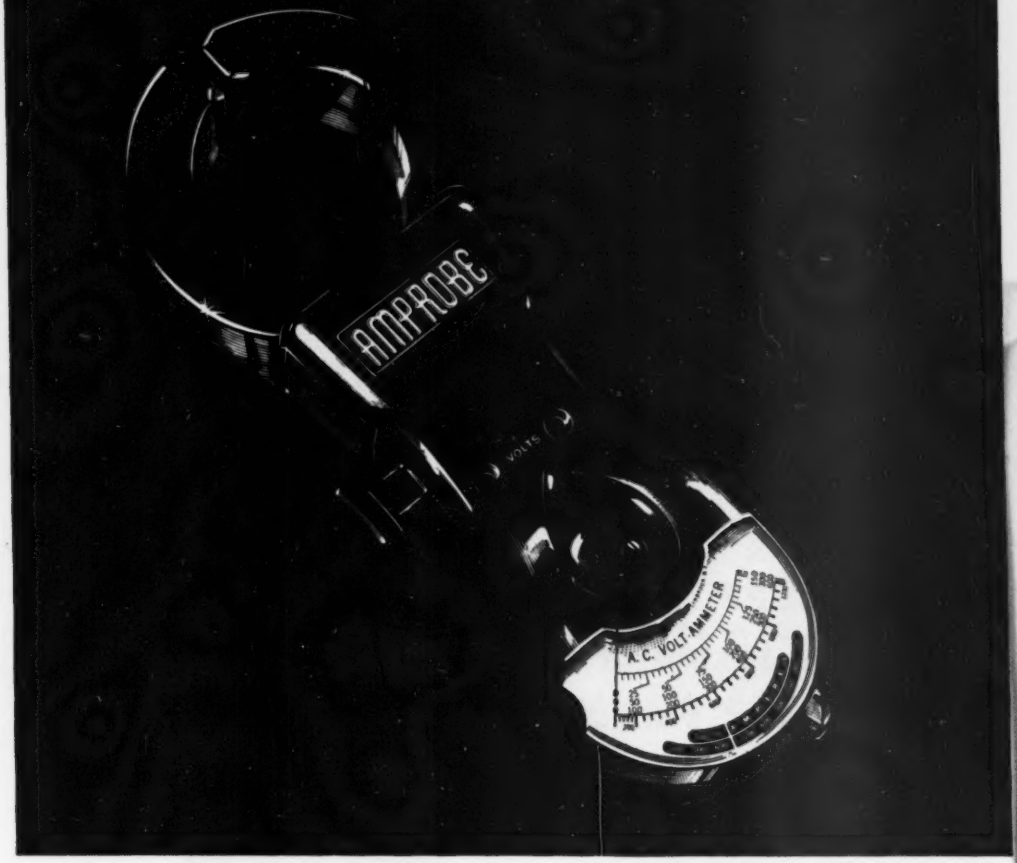
MOLONEY ELECTRIC COMPANY

Manufacturers of Power Transformers · Distribution Transformers · Load Ratio Control Transformers Step Voltage Regulators · Unit Substations

MOLONEY ELECTRIC = { BETTER PERFORMANCE / GREATER RELIABILITY / LESS MAINTENANCE

SALES OFFICES IN ALL PRINCIPAL CITIES · FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA

new 1200 amp. AMPROBE



Take the new Amprobe "1200" into your hand. Compare it with any other high-current volt-ammeter. You'll quickly recognize the advanced engineering and design that have gone into the "1200".

ELIMINATES ERRORS: Exclusive doughnut-type transformer eliminates for all practical purposes the factor of error due to position of conductor. COVERS NINE RANGES: 0-15/60/150/300/600/1200 (yes, 1200) amps AC, 0-150/300/600 volts. SAFER: Probe jaws insulated right down to the sockets. Voltage test lead plug automatically insulates itself when removed from meter. MORE CONVENIENT: So compact, carry it in your pocket!

Only $67.50, with leather case and leads. Also Amprobe "600", up to 600 amps, $59.50. Pyramid Instrument Corp., Lynbrook, New York.
(Export Division: 458 Broadway, New York City. Cable: Morhanex).

AMPROBE®

the only pocket-size snap-around volt-ammeter

WRITE TODAY: Dept. EW-12

Pyramid Instrument Corp.
Lynbrook, New York

☐ *Send Bulletin No. 128, describing new Amprobe Models "1200" and "600".*

☐ *Send 16-page manual of time-saving uses: "Servicing with the Amprobe".*

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Company _____

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IT'S THE *PORCELAIN*
THAT INSULATES

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Only the LAPP Suspension Insulator is made of LAPP PORCELAIN

"A sound piece of porcelain—severely tested—assembled in such a way as to permit it to live," has always been the Lapp creed in the design and production of high voltage insulators. In suspension insulators it means unsurpassed serviceability.

Lapp

LAPP INSULATOR COMPANY, INC., LE ROY, NEW YORK

Profitable Load for Tomorrow Belongs to Those Who Prepare For It TODAY!

GUNS and BUTTER... *Then What?*

In the days ahead, when we have returned to a more normal civilian economy, the electric utility industry will be faced with a vigorous reactivation of its job to bring all-electric living to reality across the nation. Hotpoint, with a tradition of close cooperation and an understanding of utility problems, has taken the lead in effecting a transition which gradually but surely is bringing this objective nearer achievement.

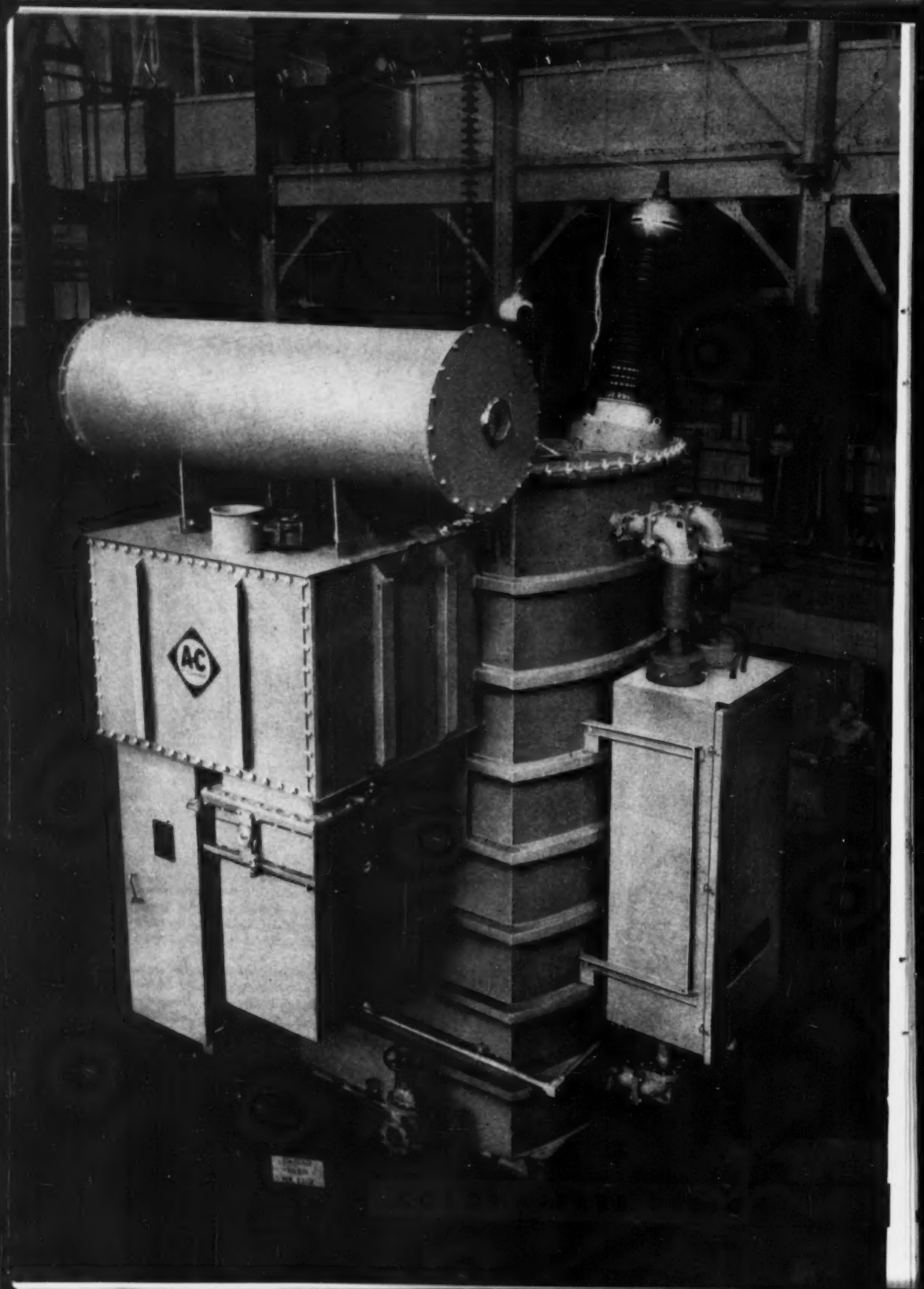
Because of its aggressive promotion in bringing today's low-saturation and **load-balancing** appliances nearer the demand stage . . . its pioneering and leadership in the promotion of all-electric kitchens and home laundries . . . the resounding acceptance it has developed for its **full family** of appliances, Hotpoint is maintaining an upsurging demand by homemakers for **all the electrical** servants that make up the modern electric home of today and for tomorrow.

As the obstacles to an unrestricted domestic economy are removed, Hotpoint will have the way open for still greater utilization of domestic electrical load through avenues of profitable **load-balancing.** Hotpoint's Utility Division is at the service of any utility company desiring assistance in developing **load-building** or **load-balancing** programs for today or tomorrow.

Hotpoint

(A General Electric Affiliate)

5600 West Taylor Street • Chicago 44, Illinois


AC

• *What Is Corona?*

Corona, a dielectric discharge, ionizes, heats and chars insulation and then permits insulation to conduct electricity. If corona is present, insulation has already started to break down, but the transformer may continue to operate. Your transformer may not fail at the first sign of corona, a month later or even a year later, but its fate is decided. Corona will continue its attacks on insulation even though voltage stresses do not increase. In time, insulation will become conductive. That means trouble.

• *What Is CORONA-FREE Design?*

Corona-free design eliminates dangerous corona. Corona-free transformers are designed to be free of slightest corona that could harm transformers in years of operation.

This design is the result of a number of transformer improvements. It means high voltage parts are shielded, dielectric fields redirected and insulation properly spaced near high voltage conductors.

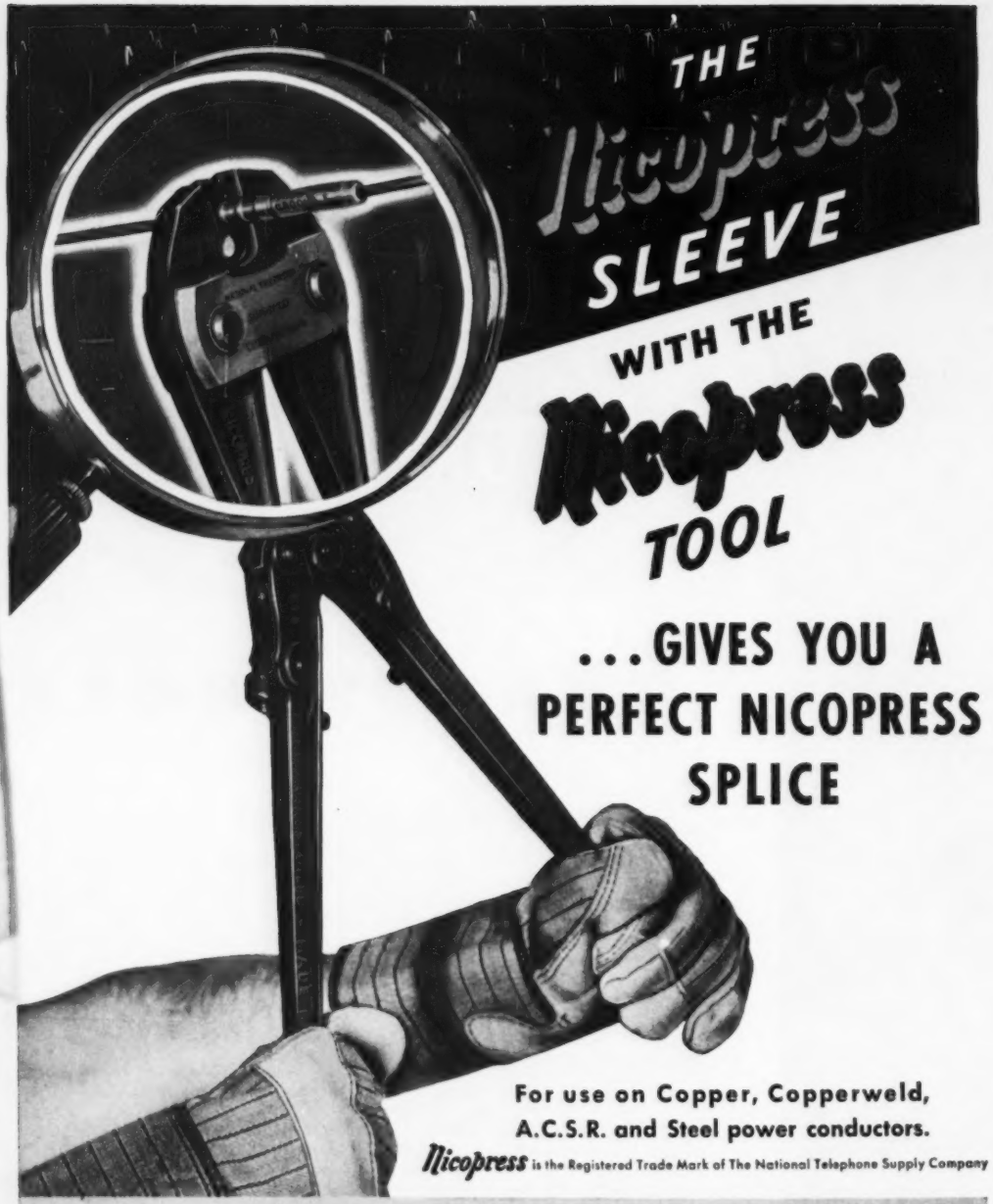
Allis-Chalmers transformers are designed to be corona-free at even the highest test voltages.

A-3350

Allis-Chalmers
Milwaukee 1, Wis.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS



THE Nicopress SLEEVE

WITH THE Nicopress TOOL

...GIVES YOU A PERFECT NICOPRESS SPLICE

For use on Copper, Copperweld, A.C.S.R. and Steel power conductors.

Nicopress is the Registered Trade Mark of The National Telephone Supply Company

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Save copper with
CHASE BUS CONDUCTORS

You can cut your copper requirements for bus conductors up to 36% by using Chase ventilated square copper tube bus conductors, instead of rectangular flat bars.

Chase square copper tube buses can withstand heavy short circuit stresses because of their high mechanical strength. The large cross-sectional areas permit longer spans between supports without unduly large sags.

They have high thermal conductivity and low resistance voltage drop and power loss per pound of metal. Send for the Chase Copper Bus Conductor Handbook giving specifications and installation data.

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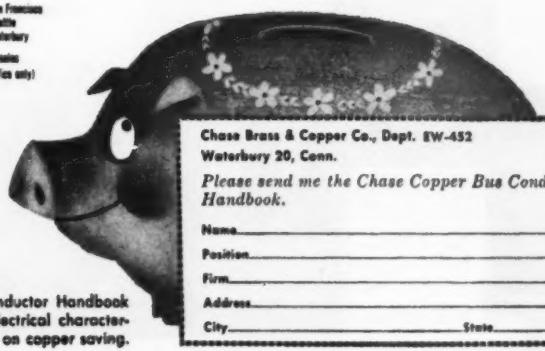

FREE Chase Bus Conductor Handbook gives physical and electrical characteristics as well as data on copper saving.

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Waterbury 20, Conn.

Please send me the Chase Copper Bus Conductor Handbook.

Name_____

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Utilize the flexibility of
. . . for continuous measurement

Check this Flexibility

- √ *Variety of circuits...potentiometer; Wheatstone, Kelvin and impedance bridges . . . for all power plant measurements, including generator temperatures described on opposite page.*
- √ *Auxiliary switch for audible or visual alarms.*
- √ *Chart speed from ½" to 120" per hour.*
- √ *Selection of models — single-point and multi-point, in choice of printing speeds.*

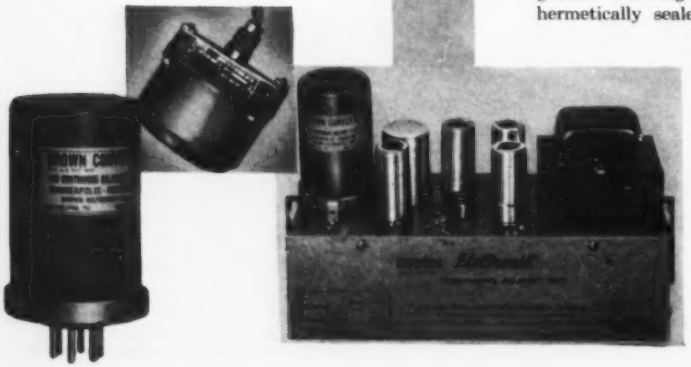
THE flexibility of the entire line of Brown instruments makes available a variety of combinations well qualified to fill the measuring, recording and signalling requirements of any power plant. Use of standard, interchangeable components simplifies maintenance, reduces parts-stocking problems.

Thanks to this flexibility, the *ElectroniK* Recorder is applicable to measuring pressure, flow, speed, pH, conductivity, power, current, temperature . . . the *same basic instrument for all*, with changes only in measuring circuit and sensing element.

Check the flexibility features . . . then call in our local engineering representative for a discussion of how they can add to your operating efficiency.

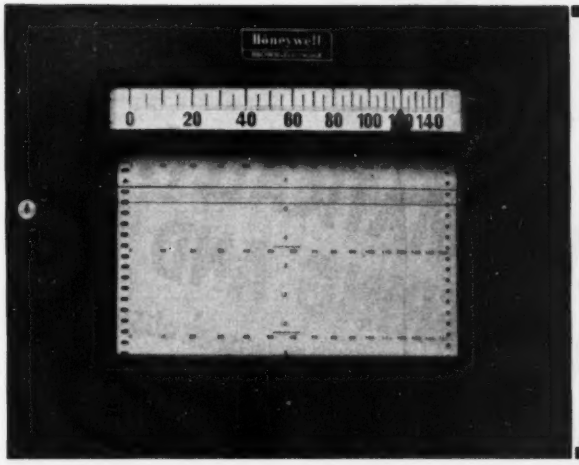
Dependability, Too!

The dependability you demand from your Recording instruments is insured by the *ElectroniK* Recorder . . . by the dependability of its primary components which are life-tested, service-proved and designed for minimum, easy maintenance. You can appreciate at a glance the ruggedness of the high-torque balancing motor, the hermetically sealed converter, the simplified continuous-balance amplifier . . . as well as the minimum of moving parts and the obvious freedom from adverse effects of dust and atmospheric humidity.



ElectroniK Recorders *of generator temperatures*

THE *ElectroniK* TEMPERATURE RECORDER



Important Features

- *Continuous Balance measuring system with electronic non-cyclic balancing.*
- *Rotor temperature recorder—Kelvin Bridge type—is calibrated for the individual generator.*
- *Stator temperature recorder works with AIEE standard copper resistance thermometers.*
- *11-inch scale is easy to read at a distance; open, legible chart provides detailed temperature records.*

IF, LIKE MOST power men today, you're squeezing every possible kilowatt from your generators, here's a sure way to prevent overheat damage. Assign *ElectroniK* Recorders to the job of watching generator temperatures . . . and you'll have a continuous, accurate measurement of heat rise that will help you keep within safe limits for insulation.

ElectroniK Recorders are supplied both for rotor and for stator temperature measurements . . . and for countless other power plant temperatures in hydrogen coolers, transformers, cables, cooling oil and bearings.

Service-proved in thousands of industrial installations, the *ElectroniK* Recorder operates on the continuous balance principle. Its unit construction eliminates delicate mechanical linkages . . . assures long, trouble-free operation, minimum maintenance.

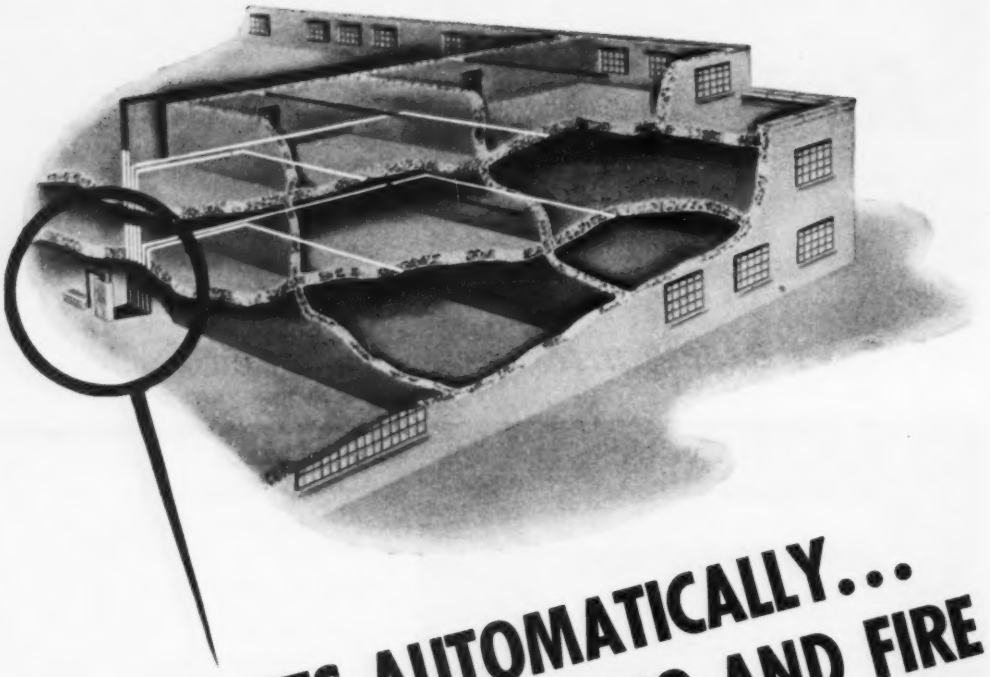
MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4568 Wayne Ave., Philadelphia 44, Pa. Service facilities available in more than 55 principal cities throughout the United States assure prompt attention to maintenance requirements.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS

First in Controls

● *Important Reference Data*

FOR MORE DETAILED INFORMATION, WRITE FOR DATA SHEET NO. 9.1-7 . . . AND CATALOG 90-2, "SUPERVISORY INSTRUMENTS FOR POWER GENERATION"



DETECTS AUTOMATICALLY... SMOKE, SMOLDERING AND FIRE

at any location in your plant or warehouse!

Each fire hazard point gets highly efficient, round-the-clock fire watchman service simultaneously, when a building is completely protected with a modern, fully approved C-O-TWO Automatic Smoke Detecting System.

The first whiff of smoke sets off an alarm, based on an exclusive operating principle . . . no chance of smoke, smoldering or fire spreading . . . instantly, the air conditioning shuts down, doors and dampers close, operating equipment stops and fire extinguishing systems actuate . . . a truly automatic fire watchman.

Four types of smoke detectors and several installation arrangements are available to fit your particular needs . . . single space systems, double space systems, multiple space systems, air conditioning duct systems . . . all function by drawing continuous air samples through simple piping to a smoke detector.

Actual fire tests made by the Underwriters' Laboratories, Inc. show that fire detection with this type of smoke detecting equipment is much quicker than other methods . . . because usually there is smoke or smoldering before flames break out.

Remember fire doesn't wait . . . so, with current expensive delayed replacements, why not let an expert C-O-TWO Fire Protection Engineer help you now in planning economical, fully approved fire protection facilities. Write today for complete free information . . . no obligation.

C-O-TWO

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MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT
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Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems

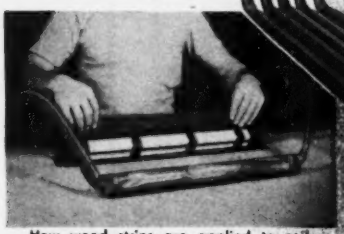
Protection of renewal parts for....

Elliott FABRI-STEEL MOTORS AND GENERATORS

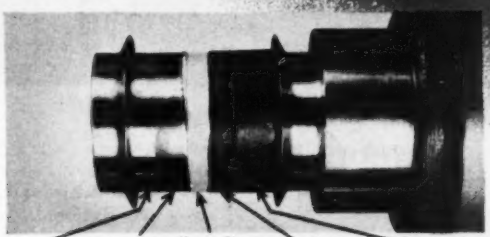
Times like these demand for assurance of continuous operation, the emergency stocking of certain renewable parts for large electrical equipment. Elliott meets this situation by supplying such parts packed for indefinite storage by a method used by the Armed Forces for overseas shipment, which successfully eliminates deterioration difficulties under practically all storage conditions.

Stator coils are held in true shape with kiln-dried wood strips metal strapped over oxygen-free cloth strips to straight sections, which are then wrapped in oxygen-free cloth. Oxygen-free tape covers ends and leads. The entire coil is then dipped in a special wax. Coils are then blocked in sealed wood cases for mechanical protection.

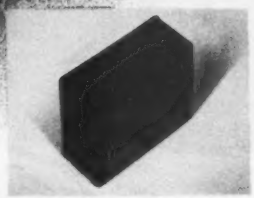
Dipping the taped coil in special moisture-proof wax.



How wood strips are applied to coil before overall taping.

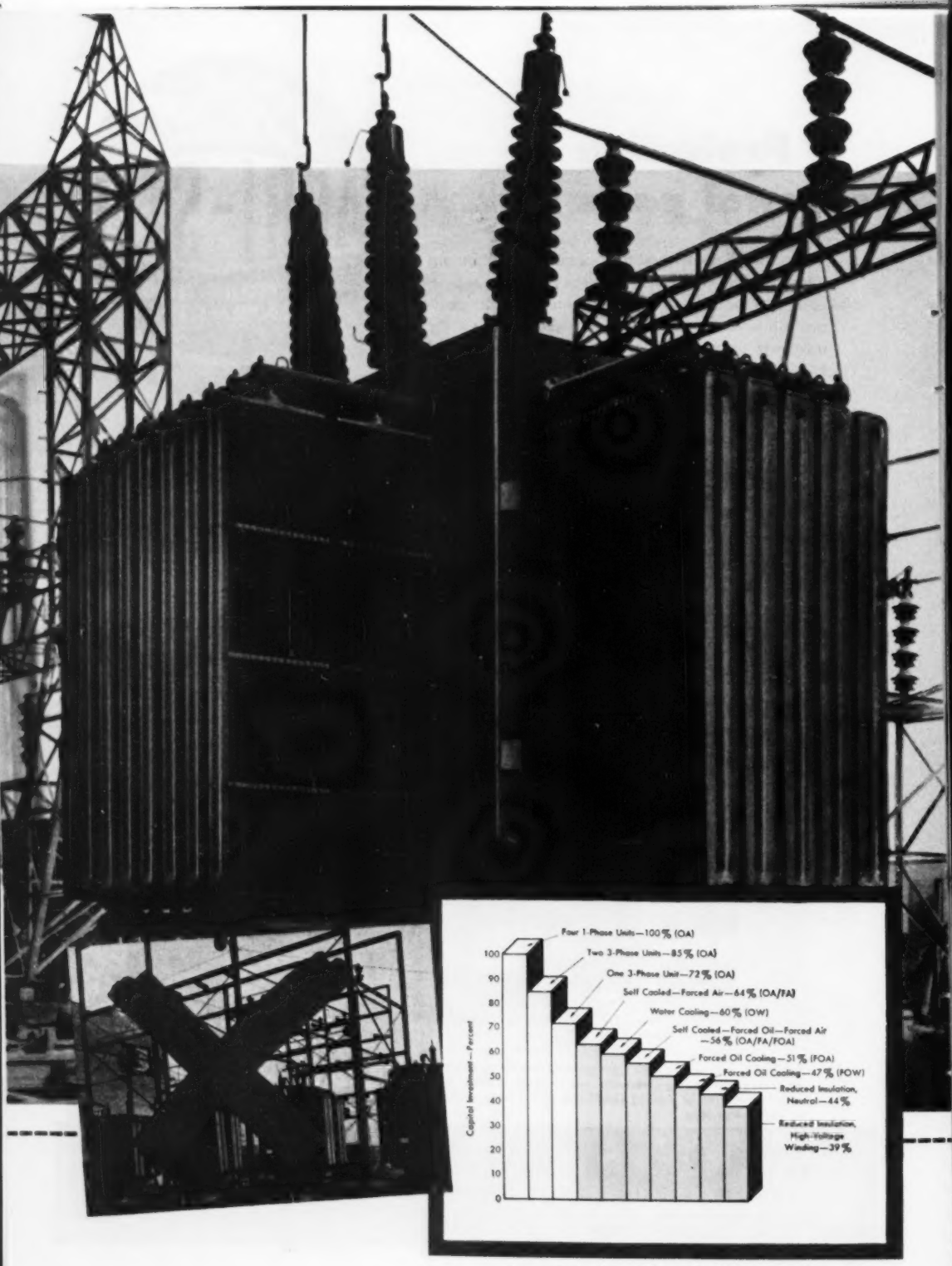


Polished journal surfaces are kept corrosion-free by application of easily removed sealing compound, vapor phase inhibitor paper, a further coating of slushing compound, and a final application of oxygen-free tape.



Small parts are packed in standard packages, covered with oxygen-free tape, and wax-dipped to seal out all corrosive atmospheres.

R2-4



Summation of possible reductions in investment for generating station transformer banks.

MODERN 3-PHASE POWER TRANSFORMERS

Cut Capital Investment 15% to 28%

Important improvements in power transformer design and applications can bring savings that add up to 50%, and more.

For example, banks of single-phase transformers are being superseded by three-phase units, used singly and in pairs. In a typical instance, two three-phase transformers cut initial cost by 15% over a four-unit single-phase bank. Since reliability has been increased to a point where outages are practically negligible, a single large three-phase unit can be used, at an additional savings of 15%, or an over-all economy of 28% . . . and there's an appreciable improvement in transformer efficiency.

These examples are based on straight self-cooled design. By various applications of new cooling and insulating techniques, capital savings can be made to reach, or even exceed, 50%.

Westinghouse Power Transformers are smaller and lighter per kva than any other transformer on the market. As a result, you can expect these additional savings:

1. **Reduced space required.**
2. **Smaller foundations.**
3. **Smaller superstructures.**
4. **Lower field-assembly expense. Transformers shipped more completely assembled.**
5. **Lower maintenance expense . . . Rugged all-welded construction plus smaller size.**

Your Westinghouse representative will be glad to give you complete details. Phone him today, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70580

WESTINGHOUSE POWER TRANSFORMERS ARE SMALLER AND LIGHTER PER KVA THAN ANY OTHER TRANSFORMER . . . YET THEY GIVE SUPERIOR PERFORMANCE

YOU CAN BE SURE . . . IF IT'S

Westinghouse

POWER TRANSFORMERS

WESTINGHOUSE

Where you will find THE REAL REVOLUTION

"If we keep in mind the values of opportunity, competition, democracy, productivity, then it is our capitalist society which is the truly revolutionary one – the only society which offers true hope to the masses for release from the long nightmares of tyranny. It is we, not the Marxists with their reactionary ideas of the good dictator, who have the truly constructive, the truly revolutionary ideal."

– from "Capitalism" by David McCord Wright.

If we can only win recognition of this truth, we shall win the struggle of free men against communism. This editorial discusses some of the hurdles that must be cleared.

To win the needed recognition that "our capitalistic society... is the truly revolutionary one," we must keep pounding away both abroad and at home. That is because the communists simultaneously attack us on an international front and try to undermine us from within.

The present drive to rearm ourselves and our allies is crucial to our self-protection on the international front. We must be prepared to meet the armed force of aggressive communism with armed force if we are to secure our physical freedom.

Arms are not enough

But to re-establish parity in arms is only half of the battle. In the last analysis it is not the more important half. To be effective, our arms must be backed by loyalty of men to our ideals. So, both abroad and at home, we must win men to the faith that we do have "the truly constructive, the truly revolutionary ideal."

On the international front, the effort to win adherence to such faith in our capitalist society meets tough going. That arises from the fact that in some of the countries that are allied with us in the fight against communism, capitalist society has offered to its people no such ideal. In varying degrees "the values of opportunity, competition, democracy, productivity" – those key aspects of American capitalism – are either absent or subordinated in their economic life. Indeed, the *Wall Street Journal* recently remarked that "to the European, capitalism has become synonymous with cartels – and with the disregard cartels foster for the consumer, the worker and the over-all well-being of the nation's economy."

No Simple Solution

Nonetheless, many European labor and governmental leaders sincerely believe that cartels are essential to their economic salvation. They believe that without such restrictions in congested European markets there would be intolerable cut-throat competition and instability of employment. Thus, when we point out that the cartel capitalism so prevalent in Europe lacks the constructive qualities of competitive American capitalism, we may offend European leaders whose wholehearted cooperation we need in the fight against communism.

But, if we soft-pedal that contrast, we sacrifice the opportunity to win understanding and loyalty from millions of Europeans who have had no chance to learn that capitalism can be the constructive and liberalizing force that it is in the United States. Indeed, when many of these millions embrace socialism it is not because they love it. They are rather desperately seeking a tolerable middle course between what they consider the hateful extremes of communism and the undesirable aspects of capitalism as they understand it.

New name not the answer

We know that there is no easy way to handle the problems created by such misunderstanding of American capitalism. Neither do we share the belief that much of the difficulty would be overcome if we were to call American capitalism by some other name. By doing that, the argument runs, we shall relieve it from the unpleasant connotations that are attached to the word capitalism in some other parts of the world. But, after all, if we are to give up all the terms that have come to mean something else in other parts of the world, we must begin by ditching the term "democracy" which, in the official jargon of the Kremlin, seems to mean what we call dictatorship.

In spite of the difficulties, however, we must stick to this job of exporting the truth that our capitalist system does offer opportunity, competition and democracy. We must let the rest of the world see that it means a continuous drive for increased productivity, and the search for profits by increasing sales and consumption, not by trying to sell less for more.

Export alone not enough

The spreading of truth about American capitalism will not be effective if it is merely directed abroad. Unless it is carried on at home also, it will lack the driving faith that is essential to any convincing export of this type. Nor will export alone come to grips with the communist attack on our country from within—an attack that gets too much help from loyal Americans who short-sightedly repudiate the basic principles of our institutions in their efforts to reform some of their deficiencies. For success both at home and abroad, we must have right here at home a much more militant recognition that it is in fact our capitalist society which offers "the truly constructive, the truly revolutionary ideal."

Here at home, too, this raises difficult complications. Businessmen who are among the leaders and principal practitioners of capitalism, have generally been catalogued as conservatives. Hence, many people must stretch their imaginations a bit to see that businessmen are leaders of a development which has so greatly and so rapidly improved the lot of free men in America that it is truly revolutionary.

These difficulties of definition, however, are relatively superficial aspects of the problem of seeing our capitalist society clearly. The basic facts are that:

American capitalism is leading free men to an ever higher material standard of living while respecting their spiritual, social and political freedom.

Communism is leading its people back into a life of servile regimentation under dictatorship.

American capitalism advances to high ground never before attained by free men. Communism retreats to ground that men with an appetite for freedom throughout the ages have sought to escape. If we can establish this truth firmly, around the world, we shall no longer need to worry about communism. It will be hopelessly sunk.

McGraw-Hill Publishing Company, Inc.

KERITE
CABLE-GRAM

THE PLUS VALUES OF A PRODUCT WELL DESIGNED AND BUILT FOR LONG SERVICE WILL OUTLAST YOUR MEMORY OF THE DAY YOU BOUGHT IT BUT WILL NEVER OUTLAST YOUR APPRECIATION OF ITS WORTHINESS.

THE VALUE AND SERVICE LIFE OF A PRODUCT CAN BE NO GREATER THAN THE INTEGRITY AND CRAFTSMANSHIP OF ITS MAKER.

DAYS KERITE

KERITE CABLE

THE KERITE COMPANY—30 Church St., New York 7, N. Y.
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Effect of the TV Thaw on Utilities

When MacArthur came home, television put its first peak on an electric utility load curve. That was a year ago, and the utility was New York's Con Edison. How many peaks TV will put on how many utility load curves this year is anyone's guess. But one thing can be said for certain. It is that this year—with politics rampant and with 16 million and more TV receivers in use—will furnish a pattern by which the future television load, now that the "freeze" on new stations has been lifted, can be judged.

It is true that the FCC announcement of April 13, opening the way for up to 3,000 television stations in this country, will have little or no immediate effect on electric utilities. The granting of licenses, the building of stations, and the attainment of production and distribution volume of UHF receivers and adapters will take time. But that time will be as short as the television industry can possibly make it.

The electric utilities will be making a grievous mistake if they do not see the coming months for what they really are—just a short time granted by the Goddess of Fortune to assess and estimate what the future has in store. It is time given them to prepare for what television will demand from them and to realize what it will offer them, one, two, five years from now.

The utilities must look forward, not really too far ahead, to when television will be in practically every home, as radio is now. That will mean 40 million or more receivers, a load of 8 million kw consuming 7.2 billion kwhr per year at residential rates. That's money to be thought of. Added to these will be the loads and energy consumptions of, and the revenues from the stations themselves, not so easy of present estimate but not on that account to be despised. Television will be big business in the electric utility book; there's no doubt of it.

There is another aspect of television that is gradually being perceived by the electric utilities and that will become increasingly important as the numbers of stations and of receivers grow. Television is a broad avenue for carrying the message of electrical living into the homes of America. With other sales costs already high and sure to go higher television offers a low-cost way to sell electric appliances and services. Cooking and other appliance demonstrations that formerly reached a few hundred housewives at the most, women who had to come out for the specific purpose of seeing them, now can be shown to hundreds of thousands, even millions, in their own homes. This was clearly brought out in a well-prepared discussion at the EEI sales conference in Chicago recently. (See Page 121.)

Television was held back for nearly four years. Its natural growth as a load and a load builder for the electric utilities was arrested for that time. It has now been released and will grow the faster for having been held back. The utilities have a short breathing space to prepare themselves for the growing load of television and to get set to use it for promotion of other load. They should make the best use possible of the few months of grace ahead.

Sensible-izing Residential Rates

Rates can be put into line with costs without customers raising Cain—not too much, anyway. The Taunton, Mass., municipal system proved this by sensible-izing its rates.

The Taunton case is a prime example of the rate problem that faces many electric utilities today. Revenue is insufficient, particularly that from residential customers. The obvious conclusion is that the rate is too low, should be increased. Probably that is so, but the true solution of the problem is not arrived at by such simple thinking.

Most present-day residential rates were designed years ago when the average requirement and use of electricity in the home were much less than now. Today, such rates just do not fit the conditions of residential service. The load has grown out of its rate clothing, like a 'teen age boy in last year's suit. You don't just buy the boy a bigger suit; you try to get one that fits him. That's the residential rate problem. To fit the residential load, the rate must be tailored to it.

This means that the rate must be put into line with the cost to serve the load, present and future. This is, of course, the basic philosophy of rate making. But particularly in respect to residential rates, it has not been followed any too closely. Now the load has reached such size that in equity to both customers and utility a correction must be made in fuller recognition of the basic principle. That is what was done in Taunton.

By Their Words

"But I say to you unequivocally that if by 'creeping socialism' our opponents mean the Bonneville project, full development of the Columbia River, TVA, rural electrification, the St. Lawrence Seaway, and hydroelectric projects . . . then the danger we must watch out for is not 'creeping socialism' but 'insidious reaction' cloaked in soft words and high-paid advertising."

This is a quotation from a recent Portland, Ore., speech of Sen Estes Kefauver of Tennessee who is actively seeking the Democratic nomination for the presidency of the United States.

By their words ye shall know them.

Insult to Intelligence

Power plant operators are unique personalities in two significant respects—they show a low rate of turnover and a high rate of unexcitable intelligence. The latter is important because there is no other group of utility employees similarly called upon for instant, reliable reaction to emergencies. The latter responsibility dictates that the men be given every reasonable instrumental aid to do their tasks promptly and wisely.

That very provision in the design of the control room raises some questions that could have diametrically opposite answers. Thus, the instruments can be arranged so that those associated with separate functions will be in distinct functional groupings (e.g., those related to pumps, heaters, boiler temperatures and pressure, generator, vacuum, etc). It is insurance against inadvertent or uninformed action that could do serious damage to major components of a $15-million or $20-million plant.

But open to argument is the matter of mimic arrangement with flow lines representing the order of sequence from coal pile to generator terminals. Also under consideration is color coding of the instrument cases so that quick identification can be facilitated. Both color and graphical arrangement can, however, have an adverse psychological reaction upon the operators verging on "insult to their intelligence." If this happens the super-refinement may defeat its own purpose even if it does not lull the control room staff into false dependence on a profuseness of technical aids.

Enough has perhaps been said to indicate that centralization of control is tending to go beyond the original economic objective and treading on psychological ground. The operators know how important their decisions are. They know what is expected of them. They are likewise intelligent enough to know what tools they need for their tasks. The guess is that not all are being asked the question by those who design the control room layout and equipment.

Let True Flood Control Be the Goal

The flood waters of the Missouri Valley will undoubtedly bring with them a flood of proposals for federal flood control projects. It is most likely that there shall be new demands for a Missouri Valley Authority. As this is an election year, the politicians of both parties can be counted upon to support measures which they may feel are approved by many thousands of voters.

Of the need for flood control in the Missouri Valley there can be no argument. Loss of life and property cannot be tolerated. So let the federal government fulfill its obligation to provide flood control. But it should not be used as an argument for the construction of huge federal dam projects or for the setting up of autonomous authorities to usurp the rights of the states and the people. Let the government build flood control dams where they belong and sponsor other effective control measures. Let the goal be the end of floods and not the end of the taxpaying, investor-owned electric companies.

Another Champion for Private Enterprise

In the Northwest where federal and private power are struggling for supremacy, there has appeared in the camp of the latter a new ally, the Independent Engineers for Private Enterprise. This is an unaffiliated group as its Oregon chairman, F. R. Schanck, has informed Electrical World:

"The Independent Engineers for Private Enterprise was formed to consider, investigate, and recommend the best instrument for planning and controlling the development of the land and water resources of the Pacific Northwest. It is comprised of a group of 1,400 engineers practicing in the Northwest and does not include engineers in the employ of the federal government or of the electric utilities. This exclusion was deliberate so that our opinion could be freely expressed without bias. We self-finance our expenses and receive no aid from any corporation or agency."

Such an ally in the camp of private enterprise is most welcome. The action of the engineers in forming their own group should set an example for other professions and industries. Such groups could contribute much to the cause of private enterprise in its battle with socialism. And this, not the fight between private and federal power, is the real battle.

THE ELECTRICAL WEEK

Featured in the News

Power availability will be a key factor in locating AEC's gaseous diffusion plant (p 108) . . . U. S. reaches informal accord with Canada on the **St. Lawrence** (p 111) . . . Utilities in the flood areas are standing up fairly well (p 112) . . . **Reorganization plan** submitted to shift some of Army Engineers' power functions to Interior (p 113) . . . TV unfreeze won't mean an immediate upsurge in power load (p 114) . . . **Power briefs:** Electrical World launches a new department (p 115) . . . MVEA hears talk on profits (p 116) . . . Accounting departments can help the utilities' public relations, **AGA-EEI Conference** is told (p 117) . . . Public Relations and Advertising (p 119).

• • •

Latest from Washington—Former Federal Power Commissioner **Mon C. Wallgren** has about given up the idea of becoming a candidate for senator in his home state of Washington . . . Senate has passed and sent to the House a bill which would make it more difficult for the **President to remove SEC and FPC members,** and would permit commissioners whose terms have expired to continue in office until successors are appointed . . . SEC sets hearing May 6 on distribution of **Washington Water Power** common stock to American P&L shareholders . . . DPA is considering establishing **production goals** for output of power transformers and some types of turbines . . . **Rep John Rankin,** D-Miss., tells the House that public power issue is "the battle of the century." He pointed out that if Northeast power were developed like that of the TVA area or Ontario, Canada, the people of New Jersey wouldn't have been "overcharged" $102.4 million in 1950, by TVA yardstick.

From New England—Record high in hydro generation on **New England Electric System** was reached in first quarter, 1952, Pres Irwin L. Moore reveals. The 1952 hydro output was 25% above normal for plants on Deerfield and Connecticut Rivers . . . Another **commercial electric cooking school** promoted by Power Engineers Association of New England has been announced for June 9-13 by Culinary Institute of America at New Haven, Conn. Enrollment is limited to 35. E. B. Haskell of United Illuminating Co, New Haven, is handling applications.

From West North Central—Union Electric of Missouri Pres J. W. McAfee tells supervisors at dinner that progress is being made in plan for distribution of Union Electric common stock to North American stockholders, through which holding company will be absorbed by Union.

From Far West—Water Project Authority of State of California, Sacramento, asks FPC for license to build 465,000-kw hydro plant on Feather River near Oroville . . . Power begins flowing from California Oregon Power's 11,000-kw Soda Creek hydro plant on North Umpqua River in southwestern Oregon . . . **Tacoma** may begin construction of its $146-million 345,000-kw hydro plant on Cowlitz River this fall, declares J. Frank Ward, Tacoma City Light superintendent.

From Southeast—Gulf Power gets 30-year franchise from Chipley, Fla. . . . FPC examiner recommends issuance of one-year preliminary permit to **Blue Ridge Electric Membership Corporation** for hydro project on south fork of New River in Ashe County, N. C. . . . **Duke Power** has settled $1.1 million tax claim for $7,000 as internal revenue officials had agreed to the lower figure after a "detailed and careful examination."

Financial—Potomac Electric Power plans to spend $62 million during next three years and expects to raise about $40 million from sale of securities . . . **Citizens Utilities** will split its stock on 3-for-1 basis if stockholders approve . . . **Atlantic City Electric** asks SEC approval to acquire Millville Electric and Millville Water by issuing a total of 43,102 common shares to security holders of these companies. Atlantic City plans to sell Millville Water "as soon as is reasonably practicable."

Legislation—Governor Battle signs **two emergency bills** reinforcing Virginia's power to seize and operate public utilities shut down by strikes or labor disputes.

Labor—Cleveland Electric Illuminating and UWUA, CIO, agree to 12½¢ per hour wage increase . . . **Ontario Hydro-Electric Power Commission** and Niagara Development Allied Council, AFL, sign wage pact providing for 10¢ per hour wage increase, retroactive to March 1 . . . Michigan's Gov G. Mennen Williams refers **Consumers Power-UWUA** labor dispute to fact-finding panel under the Bonine-Tripp Act. Members are Harry H. Platt, Detroit; Edwin G. Gimrich, Kalamazoo; and Joseph Arsulowicz, Grand Rapids. Union's latest demand is 21½¢ per hour. Consumers' latest offer is 12½¢ per hour.

Rates—California Oregon Power gets California PUC and Oregon PUC approval to adjust rates which will increase gross revenues by about $400,000 annually . . . **Florida Power Corp** pledges all possible speed in refunding the $1.1 million to consumers in Pinellas County as ordered by Florida RR & PUC . . . **Washington WP, Pacific P&L, and Puget Sound P&L** withdraw rate increase applications filed with Washington PSC.

Walter Kidde Nuclear Laboratories, Inc, 140 Cedar St, New York City, is established as first privately financed laboratory dedicated to the primary objective of developing commercial atomic power.

Congratulations—New England Power Service elects **Walter P. O'Neill** and **Edward F. Ziegler** vice presidents . . . Massachusetts Institute of Technology appoints **Adm Edward L. Cochrane,** dean of engineering . . . G&W Electric Speciality Co, Chicago, elects **Andrew E. Papp,** executive vice president and general manager and **C. W. Sward** vice president in charge of sales, advertising and sales promotion.

WASHINGTON COMMENT

JESSE MOCK

Considering the high mortality rate of official committee reports in Washington, it is amazing that two reports dealing with electric power have fared so exceedingly well.

These are the Morehouse Committee Report (EW, Jan. 14, p 76) and the Power Report of the Joint Congressional Committee on Defense Production, better known as the Maybank Report (EW, Jan. 21, p 190). Filed early this year, both reports have survived the interminable channels of the mobilization agencies and have avoided the gaping pigeonholes that snare many an important document.

Reports Brought Action . . . In less than three months, the major suggestions, findings, and recommendations of the two reports have brought a number of encouraging developments. To some degree, the reports are responsible for these actions:

1. Establishment of a 32 million-kw capacity expansion goal for the next three years and a tacit commitment to channel critical materials to meet it. This was an integral suggestion of both reports. The Morehouse Committee found the former 30 million-kw goal too modest and called for a realistic program. The Maybank Committee seconded Morehouse on this point.

2. Coordination of the electric power program as it is handled by the mobilization agencies has been brought a step nearer by the Electric Power Committee (EW, April 14, p 7). This followed generally the Maybank suggestion that an Office of Electric Power be created with sufficient authority to coordinate plans and allot materials needed to meet the established goal.

3. Increased third quarter allotment of critical materials for power code items have been made, and the outlook is brighter for succeeding quarters. This, of course, followed the general suggestions of both reports.

On other fronts, too, progress is being made toward fulfillment of the two reports. Significant steps have been taken in charting the item-by-item needs of the power expansion program, and this is proving highly useful in allotment of scarce materials. Defense Electric Power Administration has a general program worked out as to the priority of plant construction needed to meet vital defense loads.

More Materials Make Goal Attainable . . . Of course, the military production stretch-out has made some of this progress possible. With more materials available, the huge kilowatt goal becomes more attainable. But the contribution made by the two reports should not be underestimated.

Both did much to clear away the confusion and timid approach that had crept into the policy-making level of the mobilization agencies. The Morehouse Report brought into focus the various power demands of the defense program and noted steps to be taken to meet the needs.

Main contribution of the Maybank Report was to give political support to electric power expansion. The document is serving as the only clear Congressional directive relating to the subject.

Together the reports have given a powerful impetus to the government men on the operating level of the mobilization agencies. Where there was once hesitancy, there is now assurance. Where there were once vague promises, there is now action.

Other suggestions in the two reports that probably will be passed up are daylight saving time and relaxation of federal jurisdiction over interconnections. Besides the questionable value of the suggestions, they pose problems beyond the authority of the mobilization agencies to cope with.

The progress already made is greater than most industry folks would have expected a year ago.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Turn-to-turn defects in generator coil insulation can be found by oscillographic comparison of the behavior when a voltage surge is impressed simultaneously on a good and a doubtful coil.

High harmonics in the system voltage wave tend to load capacitors needlessly with correspondingly high harmonic currents.

Taping a joint of stranded conductors does not necessarily exclude the moisture that may travel between strands and subsequently promote galvanic corrosion if the conductors and/or connector are of dissimilar metals.

Sunlight can be concentrated by lenses about 50,000 times in intensity to operate high-pressure high-temperature boilers. To generate the 75,000,000 kw of today's U. S. A. would require solar plants covering 25,000 square miles.

Effective insulator washing is largely a matter of removing the water-soluble and conductive deposits.

Crew member stationed at a safety switch in series with truck ignition is a worthwhile precaution when setting a pole with derrick or winch operated by power take-off.

Gas turbines may be reduction-geared in groups of three or more to a single large 3600 rpm alternator—a way out until prime-mover and generator can be individually matched in ratings.

Ceramics on the face of metals subjected to high temperature might resist corrosion and abrasion better than the metals but the efficacy would depend on the bond of the ceramic to the metal.

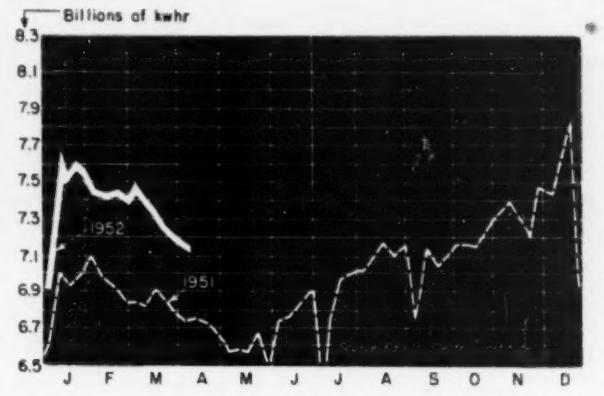
Sealed-type dry transformer tanks may rupture under the pressure of generated gas, whether insulation is in the conventional forms of Class A, B or H, if an external fault lasts long enough to decompose all the turn insulation.

Interstrand resistance of aluminum cable is likely to be high and a joint a poor one unless the ever-present aluminum oxide is removed from each strand. Otherwise current distribution will be unbalanced and heating likely excessive.

Aluminum conductor has occasionally stood so well that it has been removed after 20 years of service and reeled up for reinstallation elsewhere.

Gamma-ray sensitized sheet of cardboard can be placed behind the film in a camera. If radiation is suspected the film can be processed to determine whether it was "exposed" by light emitted by the cardboard.

STATISTICS



Output Week Ended April 12—7,150,000,000* Kwhr

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
April 12	+6.0*	(Data on regional change not available at press time)								
April 5	+7.2	+4.4	+4.3	+5.6	+7.4	+12.5	+20.9	+7.4	+8.2	−1.5
Mar. 29	+7.3	+4.4	+7.2	+5.8	+7.4	+11.9	+18.7	+6.6	+6.5	−2.9

Electric Power Statistics

		Latest Month	Preceding Month	Year Ago
Peak Load (Million Kw)	Jan.	69.0*	70.5	63.4
Capacity (Million Kw)	Feb.	75.99	75.97	69.42
Production (Billion Kwhr)	Feb.	31.54	34.20	28.22
Hydro		9.46	9.90	8.21
Fuel		22.07	24.30	20.01
Fuel Consumption				
Coal (Million Tons)	Feb.	8.74	9.87	8.59
Oil (Million Barrels)		4.77	6.07	5.57
Gas (Billion Cu Ft)		54.82	52.27	40.50
Sales (Billion Kwhr)	Jan.	29.72	28.44	27.24
Residential		8.87	7.95	7.82
Commercial		4.99	4.77	4.57
Industrial		13.90	13.74	12.96
Other		1.95	1.97	1.89
Net Income Class A & B Utilities ($ Million)	Jan.	86.59	100.82	75.82
Estimated Dec. 52 Peak (Million Kw)	Dec.	81.1	80.7	75.3
Kwhr per Residential Customer (12 Month Average)	Jan.	2,021	2,004	1,848
Revenue per Kwhr Residential Service (12 Month Average)	Jan.	2.81¢	2.81¢	2.87¢
Canadian Production (Billion Kwhr)	Feb.	4.97	5.27	4.38

Business Statistics

FRB Industrial Production Index†††	Feb.	218*	216	217
Gross National Product Annual Rate ($ Billion)	4th Qtr.	333.0	327.6	303.7
E. W. 5 Industry Production Index	Feb.	124.8	124.4	119.7
ENR Construction Cost Index††	Mar.	115.4	115.1	112.8
BLS Consumer's Price Index	Jan.	189.1	189.1	181.5
NEMA Insulation Materials, Sales Index†	Feb.	528	548	552
NEMA Electric Appliance Sales Index†	Feb.	224	233	343
NEMA Household Refrig. Sales Index†	Feb.	153	153	238
Metal Prices				
Copper, Conn. V., lb		$ .24½	$ .24½	$ .24½
Lead, N. Y., lb		.19	.19	.17
Zinc, prime Western E. St. Louis, lb		.19½	.19½	.17½
Tin, Straits, qual N. Y., lb		1.21½	1.21½	1.34
Aluminum, ingot, base price		.19	.19	.19
Nickel, base price		.56½	.56½	.50½
Steel, billets, Pitts., ton		56.00	56.00	56.00
Steel, scrap, No. 1 heavy, Pitts., ton		45.00	45.00	45.00

* Estimated. † 1936 = 100 †† 1949 = 100 ††† 1937–39 = 100 (Unadjusted)

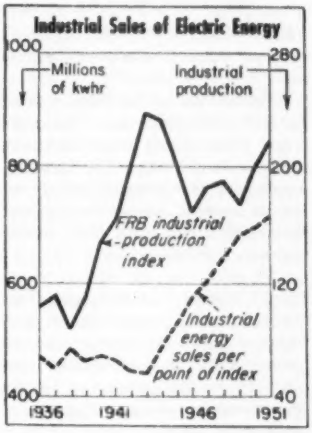
The Federal Reserve Index of Production

The Federal Reserve Board index of industrial production is one of the best measures of the physical volume of current manufacturing and mining we have. It provides a reasonably accurate indication of both long and short term changes in industrial output and shifts in industrial structure.

Forecasts of general business activity are frequently expressed in terms of this index.

Not often realized is the fact that the index is a measure of manufacturing and mining only, and not a measure of general activity.

The index covers about 30% of the total national income and less than one-fourth of the total civilian employment. Changes in the output of



manufacturers and minerals are, however, especially significant because they account for a large part of the variations in the total of all economic activity, and also because of the great extent to which they both affect and reflect other activities.

Electric energy production, not included in the current index, is of considerable importance and could be included in any comprehensive index of economic output.

The Federal Reserve Board is at present considering a recommendation by the United Nations that electric energy output be included to bring our index in line with industrial production indexes of other nations.

Power Is the Key in AEC Decision

● Location of $1-billion gaseous diffusion plant will depend on present and potential supply—Ohio River valley has the nod

● New plant will draw 1.8 billion kw, less than half the amount required under a huge expansion plan commission is drafting

● Ten private companies have been asked to submit a joint proposal to supply this and other plants in the program

Present and potential supply of electric power is a key factor in location of Atomic Energy Commission's proposed $1 billion-dollar, gaseous diffusion plant, which will require 1.8 million kw at its operating peak.

While this is the largest single plant in the program AEC is drafting, its power requirements amount to less than half the total needed for the overall additions. It is a part of the proposed $4-to-$5 billion AEC expansion program that will be sent to Congress soon.

A definite site for the diffusion plant has not yet been selected. But AEC is now concentrating its site surveys in the Ohio River Valley. This is mainly because of the potential supply of electric power at reasonable rates and the availability of water (EW, In the Industry, April 14, p 6).

Up to Congress . . . Upon approval by Congress, AEC contemplates that electrical generating facilities for the gaseous diffusion plant will be built either by private industry or by the government to supply the operating needs of the plant.

Interim power requirements for construction would increase gradually to 400,000 kw and would be obtained by construction of extra transmission lines and interconnections with existing power systems. This power would be used for a period of from 12 to 18 months and then would be relinquished gradually as the permanent power source is completed.

Several months ago AEC invited a group of power systems in Ohio, Indiana and western Pennsylvania to submit a joint proposal for supplying both the interim and the permanent power needs. The permanent power requirements would be supplied from one or two huge generating plants constructed specifically for the purpose.

Private Proposals . . . Ten or more private power companies have been formulating the proposal requested by AEC, but it has not yet been submitted in final form. No details have been released by AEC. Because Congressional authorization is still lacking, no firm orders have been placed with manufacturers for the large equipment which would be needed. However, some of the requirements have been discussed with top Washington officials.

Because of the huge power requirements, AEC is now limiting its diffusion plant surveys to areas which offer:

- Cheap fuel for the production of electricity.
- Sufficient power supply for interim needs.
- Ample water supply both for electric generating and other plant needs.
- Ability to absorb the 1.8 million kw into the regional power system in the event the AEC plant is eventually closed down.

The Ohio River Valley appears to be able to meet these demands more adequately than any area that has been considered.

It is almost certain that a large slice of the proposed AEC expansion will take place at existing plants or those now under construction. Indications are that the Paducah, Ky., AEC plant will have to carry part of the expansion load.

Presumably the four new generating units Tennessee Valley Authority proposes to add to its Shawnee Plant would supply power for the Paducah expansion. Money for these units has been denied by the House because the Paducah expansion has not been duly authorized by Congress, but the Senate may recommend restoring the funds.

More from Joppa? . . . There is also the possibility that Electric Energy Inc's Joppa Plant may have to install more capacity if the Paducah expansion comes off.

But it has been made clear that the Shawnee and Joppa plants will not serve as alternate sources of power supply for the proposed new gaseous diffusion plant. The new plant will have a firm supply from plants specifically designated for its use.

Aluminum Wiring...

. . . is being pushed by government officials. Builders urged to use it in place of copper

Government pressure to get builders to use aluminum in place of copper for conductor is mounting. The Housing and Home Finance Agency is recommending aluminum for house wiring, and Army and Navy engineers are specifying aluminum as an alternate for copper wherever suitable.

And the National Production Authority is allocating aluminum as a substitute for copper.

Use Increased . . . Electric utilities are upping their third-quarter use of aluminum wiring by 30% over the first quarter of 1952, and the Defense Electric Power Administration thinks the shift will continue.

The shift isn't receiving the unanimous approval of industry. Individual electricians and electrical contractors don't like aluminum. They aren't carrying on a crusade against the use of aluminum, but when they find copper anywhere, they grab it.

Aluminum isn't as good a conductor as copper but it does have some advantages. It is lighter, less than half the weight of copper. It is cheaper than copper. The new annealed aluminum is just as flexible, and, when you consider its light weight, will take as much strain as copper wire without breaking.

There is another selling point that is making friends for aluminum. Industry and government men both believe that in six to eight months aluminum wire and fixtures will be as plentiful as copper.

PRESIDENT TRUMAN discussed the St. Lawrence agreement with Canadian foreign minister Lester Pearson (seated, right). Others who took part included (standing, left to right) Secretary of State Dean Acheson; Lionel Chevrier, Canadian Minister of Transport; Canadian Ambassador Hume Wrong; and Stanley Woodward, U. S. ambassador to Canada

St. Lawrence Accord . . .

. . . between U. S. and Canada is one of several steps planned by the administration in pushing the project through

President Truman is battling on two fronts for construction of the St. Lawrence Seaway Project.

At a top-level conference in Washington last week between U. S. and Canadian officials, Truman informally agreed on the first move toward helping Canada assume the major role in constructing the huge waterway and power development. But he did not close the door on a joint U. S.-Canadian effort to build the project.

Under terms of the agreement, both countries will now apply jointly to the International Joint Commission for authority to change water levels of the St. Lawrence so that the power feature of the project may be constructed. This feature, a dam in the International Rapids section, is integral to the project's navigation aspects.

U. S. Role Undefined . . . In filing its application with the commission, the U. S. government will still leave undefined its role in construction of the project. Truman and his advisers have not abandoned hope that Congress will approve full cooperation.

Action Slated . . . The Senate Foreign Relations Committee is slated to act this week on Seaway legislation, but the House Public Works Committee gives no sign of unbottling the legislation.

There are two alternatives for the U. S. if Congress does turn down the joint plan (EW, Feb. 18,'1952). First, Truman may ask Congress to authorize U. S. participation in building the power and dam features only. At this time no bill to this effect has been introduced in Congress because such a bill might hinder consideration of the full-cooperation measure.

As a second alternative, the Federal Power Commission might be asked to reconsider a decision issued in late 1950 refusing a license to the New York State Power Authority to build the U. S. portion of the dam and power plant. It is likely FPC would reverse its former decision if Congress decided against federal construction of dam and power feature. With an FPC license, the New York authority could build the U. S. portion of the power plant and dam without Congressional action. This move is getting White House consideration.

It boils down to this:

The power feature is an essential part of the seaway project. It is impractical for Canada to build a navigation project without the power dam. Therefore some sort of U. S. cooperation is needed, and President Truman apparently has the necessary authority to offer that cooperation. He has promised he will help Canada if Congress should fail to approve a joint effort.

Alberta Legislature OKs Export of Natural Gas

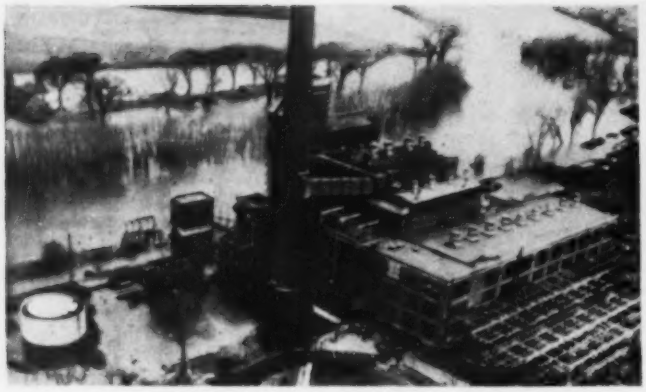
Enough Alberta natural gas to meet all demands is due to start flowing through a $100-million pipeline to Pacific Coast markets of British Columbia, Washington, and Oregon within two years.

This is considered almost certain since the legislature of Alberta recently approved the permit introduced by Premier E. C. Manning authorizing Westcoast Transmission Co, Ltd, to export natural gas from the Peace River area of Alberta to West Coast markets, as recommended by the Alberta Conservation Board earlier. Sorely disappointed by the approval were five other applicants, who wanted to pipe gas to eastern Canada and south into the United States.

Legislative approval was the first step of four required to make delivery possible. Still required, but considered positive, is approval by the Board of Transport Commissioners at Ottawa, on the interprovincial route; the Dominion cabinet on export to the United States; and the Federal Power Commission in Washington, D. C., for sale in the United States. The Transport Board has scheduled hearings for June 2, and FPC for June 16.

The Conservation Board's recommendation limited export to about 300 billion cu ft of gas over 22 years.

Frank McMahon, Westcoast president, said his firm will start surveying immediately and will begin construction as soon as approval is secured.



FLOOD WATERS from the Big Sioux River completely surround Iowa Public Service's Big Sioux Plant at Sioux City. The crew remained inside the plant, which could only be reached by boat

WORKMAN sandbags the basement of Big Sioux Plant into which water has seeped

Utilities Holding Own Against Floods

Measures adopted by power companies to protect their facilities enable them to continue normal operations

Record floods in the Missouri Valley did not catch the big utilities in the area unprepared. Despite unprecedented crests, the power companies were holding their own against the ravaging waters and maintaining uninterrupted service early last week.

The swollen Missouri, Mississippi, Minnesota, and Red Rivers and tributaries spilled their destruction over areas of Montana, the Dakotas, Iowa, Nebraska, Kansas, Missouri, Minnesota and Wisconsin.

Early Preparations . . . In Iowa early forecast of floods enabled Iowa Public Service Co to secure its plants in face of onrushing waters. The utility hired a construction firm to reinforce basement floors of two of its Sioux City plants and to build dikes around its facilities.

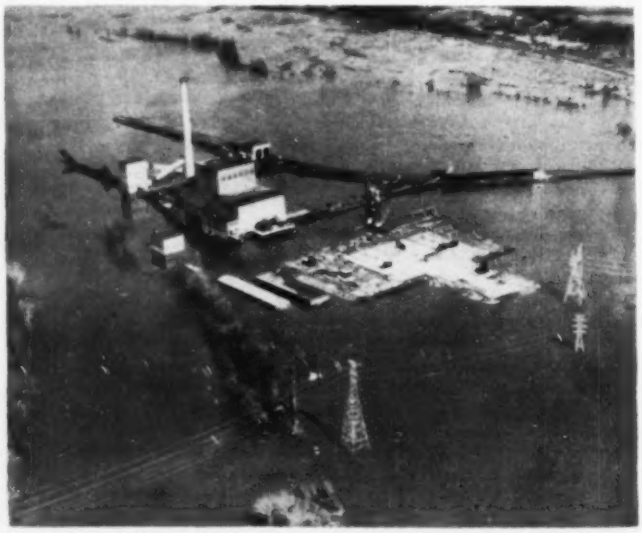
The utility's Big Sioux Plant on the Big Sioux River operated normally although surrounded by water. The plant could only be reached by boat and the crew bedded down there for the duration of the flood. The basement control room floor of the plant was sandbagged to prevent buckling from underground water pressure and also was reinforced by construction jacks placed against the ceiling. Pumps handled water seepage at the plant.

Sandbags were used to fortify the dikes around the Big Sioux Plant and substation.

Iowa Public Service's Kirk Station is located three or four blocks from the Missouri River and flood waters came within a few feet of the plant. Pumps were used to remove water from the basement. Sandbags weighted down the floor. Kirk Station is on higher ground than the Big Sioux Plant and danger to the plant was less.

A crest of 24.3 ft was reached at Sioux City on Monday April 14 and the water receded slightly the next day.

Farther south, Omaha (Neb.) Public Power District was relying on a dike to protect its Jones Street Plant. Thousands of sandbags were piled on top of the dike to meet an expected crest of 31.5 ft. The munici-



MINNESOTA RIVER swamps generating station being constructed by Northern States Power Co near Savage, 12 miles south of Minneapolis. Plant will have a dike around it when completed

pal system's South Omaha Plant also was protected in this way. A Power District plant under construction in the city was under water.

Across the river at Council Bluffs, Iowa, Iowa Power & Light Co removed transformers and other equipment from its substations and took out meters from individual homes to avoid clean-up work when the flood waters recede.

Iowa P&L has no generating stations at Council Bluffs but is building one there. Damage was expected at this plant, since it is being constructed on the river banks.

The Mississippi and Minnesota Rivers menaced plants of Northern States Power Co of Minnesota. The company's largest plant, Riverside, at Minneapolis was heavily barricaded and some water pumped from the basement, which goes two or three stories underground. The plant had six feet of water around it.

The company's second largest plant at St. Paul, Highbridge, also was sandbagged and barricaded. A plant under construction south of Minneapolis near Savage was almost surrounded by water. Construction plans include the building of a dike to protect it from future floods.

REA Stands Behind Loan to New Mexico Co-op

Approval of a $9-million Rural Electrification Administration loan to a New Mexico generating and transmission co-op will not be withdrawn except at the request of the co-op.

This was the attitude of REA in Washington last week despite the fact that Public Service Co of New Mexico had offered to meet the power needs of the co-op at a cheaper rate than the co-op can produce the power.

At issue is the plan of the Plains Electric Generation and Transmission Cooperative, made up of eleven New Mexico and one Colorado distribution co-ops, to build a power plant near Santa Fe and transmission lines to carry power to the member co-ops. For this purpose, REA in mid-February approved a loan of $9 million. Public Service, however, has made an offer which promises to meet the needs of the co-ops.

REA's position is that it has approved the loan and is bound to stand behind its action unless the co-op accepts the power company's offer.

MAJ GEN LEWIS A. PICK, Chief of Army Engineers, would yield a huge share of federal waterway development to . . .

. . . MICHAEL W. STRAUS, Reclamation Commissioner, if President Truman's plan for reorganization is allowed by Congress

Army Faces Civil Function Cut

Truman reorganization plan centers all federal waterways development in the Department of the Interior

President Truman will send to Congress within a few days a reorganization plan which would strip the Army Corps of Engineers of its politically potent civil functions projects and center all federal domestic waterway development in the Interior Department.

If upheld by Congress, the plan would put Interior in a much stronger position to take over the potential hydroelectric sites now staked out in basin development plans drawn by the engineers.

Interior now has authority to market surplus power from corps-built multi-purpose dams, and Secretary Oscar L. Chapman is attempting to reserve potential hydroelectric sites for federal development. He has been handicapped in this mission by lack of cooperation from the engineers.

• **Controversial Matter . . .** Stripping of civil functions from the Corps of Engineers was the controversial high spot of the Hoover Commission proposals. In 1949, when the commission recommended it, the transfer would not have had a chance in Congress.

Today things are different. This is an election year, and the Army Engineers have been under heavy attack on their management of overseas airbases. Trying to kill the President's plan at this time will be uphill work. The stoutest defenders of the Corps of Engineers voted for a government reorganization law that they felt sure would stop any proposal to take away civil functions from the Army. The law says that either House can veto a reorganization plan by vote of a constitutional majority of the members. At the time, that provision was enough to block any tampering with the flood control and river and harbor functions of the Army Engineers.

But in this session, it won't be easy to corral a constitutional majority against the President's plan in either the Senate or the House. If the plan is not voted down within 60 calendar days, it becomes law.

• **Proposal Rushed . . .** To meet the 60-day requirement, the President has had the Budget Bureau rushing work on the proposal. He wants to submit the plan before May 1, figuring that Congress cannot possibly adjourn until the end of June. (The Republican Convention starts July 7.) That would give the necessary 60 days with Congress in session.

Proponents of the President's plan have only to sit on their hands. They don't need to raise a finger unless the fight gets tough. It is up to the opponents to collect the majority to beat the plan. Otherwise, there is no sense in calling for a vote.

TV Faces a Slow 'Defrost'

Competition for new channels set up by FCC is heavy. That means hearings must be held—and hearings mean delay

The television "freeze" is over, but don't look for the thaw to give a sudden jolt to any phase of the business—and that includes power load.

After three-and-a-half years of off-and-on legal preparation, the Federal Communications Commission has announced it will permit 2,053 new stations in 1,291 communities. This would bring television to half the U. S. population not now in range of the 108 existing stations in 63 cities.

It Takes Time . . . But it's doubtful that more than a handful of stations can get on the air within the next year—and none of those are likely to be in any of the bigger cities that are now TV-less. Reason is the competition for the valuable FCC construction permit without which it is impossible to get into the telecasting business.

The vast public appetite for television and the swift movement of television stations from the red ink into the black have stimulated competition for the TV permits in all the major cities. FCC would have to hold hearings in each city, and the hearing procedure takes months. For a city of any size it may be at least another year before a new station gets on the air.

The one real possibility for speeding up the process lies with the applicant who gets a permit because there's no other applicant for the channel he's after. In some places, this may turn out to be the educational institution that is ready to take up the channels that are set aside only for use by non-commercial telecasters.

Staff Problem . . . One important barrier to the swift processing of the applications for TV stations is the sheer lack of FCC staff. Where there are two or more applicants for a channel, a hearing must be held before an FCC examiner to decide which of the applicants is the most qualified, and thus receives the coveted permit. At present, FCC has no examiners available to take on the TV-unfreeze, and was scheduled to receive in the budget now being voted Congress only $50,000 for the purpose.

However, Sen Ed Johnson, chairman of the Interstate and Foreign Commerce Committee, which rides herd on FCC, is proposing to beef up FCC's staff of examiners so the hearings can go forward in several cities at once. Johnson's proposal was for 20 examiner-teams, and chances are good that the idea will be approved by Congress. In this election year there's hardly a senator or representative who cares to go on record as "against TV."

POWER BRIEFS

In this time of electrical development and expansion, big stories affecting the industry break fast and often. More and more, Electrical World's editors find major developments crowding small but significant items out of the week's budget of news. So now, to give more diversified coverage of events in the field, EW launches a new department of interesting items in abbreviated form.

● A new record for power production was established at Bonneville Dam during March when its powerhouse turned out 418,843,000 kwhr. High production was attributed to favorable flow of the Columbia River which permitted operation of the ten generators virtually at full capacity.

● A General Electric Co engineer recently declared that the land-based prototype propulsion unit for an atomic-powered submarine, to be built at GE's Knolls Laboratory, will be the power plant of an actual submarine in a portion of a submarine hull. "In making the land-based model as close to the final submarine power plant as we know how, we will hasten the day when a nuclear-powered submarine can join the U. S. Navy fleet," he said.

● Ohio Edison Co will boost the capacity of its R. E. Burger Plant near Bellaire, Ohio, to 500,000 kw with the addition of a second 135,000 kw turbo-generating unit. The plant will then be the largest in the company's system.

● A third generating set of about 100,000 kw has been installed at the Harspranget hydroelectric plant on the Lule River, 22 miles north of the Arctic Circle in Sweden. Transmission of alternating current at 380 kv, highest working voltage in the world, will begin soon on the 600-mile line which goes down to Hallsberg in central Sweden. The line is believed to be the longest overhead power line.

● Pacific Gas & Electric Co plans to build two additional powerhouses on its Pit River hydroelectric development in Shasta County, Calif. Costing $45 million, the powerhouses will add 144,000 kw to PG&E's Pit River system, making the total 440,000 kw.

ALFRED H. CORBETT

Corbett Leaves Depa to Run for Congress

Alfred H. Corbett, assistant general counsel for Defense Electric Power administration, has left his government job to run for Congressman from the Portland district of Oregon. A Democrat, Corbett will meet one opponent in the May 16 primary. If he wins, he will probably face Rep Homer Angell in the general election.

The Depa lawyer helped draw up the power curtailment order for the Pacific Northwest. He will campaign for sufficient electric power for the area to make further curtailment orders unnecessary.

A vigorous Democrat, Corbett hails from a line of Portland Republicans.

New 161-Kv Line in Iowa Viewed as Start of Grid

Surveying is underway in Iowa for a 120-mile, 161-kv line viewed as the first step in a statewide interconnection system.

The line, being built by the Iowa Public Service Co, will extend from Sioux City to Fort Dodge and will connect at Fort Dodge with lines of the Iowa-Illinois Gas & Electric Co. G. A. Neal, Iowa Public Service Co president, said he expects the line to be in service in 1953.

One 161-kv line now crosses Iowa from Davenport to Des Moines, then southward to Clarinda and to St. Joseph and Kansas City, Mo. A leg of the line extends from Des Moines to Fort Dodge. The existing line connects the Iowa-Illinois Gas & Electric Co and Iowa Power and Light Co under an interchange agreement.

Changes in Capacity Reported to FPC

PLANT ADDITIONS DURING JANUARY

State	Utility	Plant	Fuel	Kw
Mass.	New England Power Co	Salem Harbor	S	75,000
Ohio	Lebanon Electric Light Department	Lebanon	IC	1,245
Ill.	Public Service Co of Northern Illinois	Waukegan No. 6	S	110,000
Iowa	Iowa Power & Light Co	Britt	IC	1,150
Iowa	Bloomfield Municipal Light Plant	Bloomfield	IC	900
Mo.	Missouri Public Service Corp	Ridgeway	IC	1,000
S. D.	West Central Electric Cooperative, Inc	Midland	IC	190
Neb.	Nebraska Public Power System	Bellevue	S	30,000
Kan.	Kansas Power & Light Co	Hutchinson	S	30,000
Kan.	Western Light & Telephone Co	Ness City	IC	1,000
W. Va.	Ravenswood Electric Light & Water Plant	Plant	IC	287
Tenn.	Tennessee Valley Authority	Johnsonville	S	112,500
Tex.	Brazos River Transmission Electric Co-op	W. R. Pooge	S	11,500
Wash.	Public Utility District No. 1 Clallam County	Forks Plant	IC	375

PLANT RETIREMENTS DURING JANUARY

Mass.	Brockton Edison Co	East Bridgewater	S	2,000
Ohio	Central Ohio Light & Power Co	Spencerville	IC	875
Mich.	Consumers Power Co	Maple River	H	192
Wis.	Northern States Power Co (Wisconsin)	Angelo	H	150
Wis.	Viola Municipal Electric Utility	Viola	H	75
Iowa	Walnut Electric Department	Walnut	IC	20
Iowa	Northeast Missouri Electric Power Co-op	Bloomfield	IC	1,500
S. D.	Northwestern Public Service Co	Huron	IC	1,000
Kan.	Western Light & Telephone Co	Medicine Lodge	IC	1,000
Fla.	Florida Power & Light Co	Belle Glade	IC	76
Okla.	Oklahoma Gas & Electric Co	Vici	IC	340
Tex.	Southwestern Gas & Electric Co	Center	IC	540
Tex.	Southwestern Gas & Electric Co	Mt. Enterprise	IC	64

H—Hydro, IC—Internal Combustion, S—Steam
United States Capacity as of February 1—Hydro, 18,861,284 kw; Internal Combustion, 1,982,188 kw; Steam, 55,066,718 kw; Total, 75,910,190 kw.

Bust of de Forest Unveiled

Dr Lee de Forest (second from right) glances at a bust of himself after it was unveiled by his granddaughter, Miss Harriet de Forest. Standing by are Admiral Ellery Stone (left), president of American Cable & Radio Corp, and Charles Edison, former governor of New Jersey and son of Thomas A. Edison. The inventor of the three-element vacuum tube was honored recently at a testimonial dinner in New York. The bust will be presented to Yale University.

LOOKING OVER safety equipment at accident prevention committee meeting during Missouri Valley Electric Association conference are (left to right) R. H. McAdams, Kansas G&E, C. D. Murdock, committee chairman, Kansas City P&L, and W. C. Boardman, Kansas City P&L

MVEA Hears Talk on Profits

Kansas G&E president tells conference earnings are more important to customers, employees than to stockholders

Profits are more important to customers and employees of utilities than to stockholders, M. F. Gill, president of Kansas Gas & Electric Co and Missouri Valley Electric Association, recently told the association's engineering conference at Kansas City.

Gill declared that employees should know this fact and should not hesitate to point it out to customers. He reasoned that profits are essential to good service, which in turn is essential to the welfare of customers, employees, and stockholders. However, he pointed out, customers and employees would find it more difficult to move their business or residence than stockholders to change their investments.

Materials Problem . . . The problem of getting materials is not over yet, D. R. McClung, director of Materials and Equipment Division of Defense Electric Power Administration stated, but the situation will improve somewhat in the third quarter. Requirements for the first quarter, he said, are: Steel, 156% of supply; copper, 155% of supply; and aluminum, 150% of supply. For the third quarter these percentages will change to: Steel, 135%; copper 141%; and aluminum, 128%.

McClung said Depa is not willing to push the utilities into the use of aluminum in place of copper where not economical, but Defense Production Authority allotments of copper and the supply of copper have influenced what Depa has been able to do.

Two network protector explosions were described by Harold Hoffman, Kansas Gas & Electric Co. The explosions were caused by accumulations of hydrogen gas, set off by sparks, in the protectors. The gas was formed by electrolytic action on water which had entered the cables through sheath faults and reached the protector through wick action.

Relaying . . . In providing relay protection on a 161-kv tie line from Kansas City to Union Electric Co's system west of Moberly, Mo., J. R. Miller, Kansas City (Mo.) Power & Light Co, said special attention was given the unusual relaying problems created by tapping the interconnection with two major loads. To obtain the high-speed protection required, carrier current relaying was provided with distant carrier current and directional and non-directional relaying combined to solve the special problems.

Inductive Coordination . . . Adequate coordination between higher voltage, 15 kv, 8.7 kv to ground or grounded neutral power circuits and telephone circuits can be secured where the power circuit neutral is multi-grounded, George Charlesworth, Iowa State Commerce Commission, said.

Capacitors, coupled with inductance coils to form a resonant filter, were installed on an Empire District Electric Co circuit to eliminate interference on a paralleling telephone circuit, C. M. Haynes, Empire District, reported. Harmonics causing the interference originated in an industrial plant.

Connectors . . . Interchangeability of connectors should not be overlooked in studies and investigations now going on with regard to aluminum versus copper as a conductor metal, E. E. DeMarsh, Burndy Engineering Co, said.

Julian Rogoff, also of Burndy, declared that larger connectors are required for underground aluminum cables than for copper cables, not only because the aluminum conductor is larger for equivalent conductivity but because of the difference in creep rates of the two metals. He added that virtually all connector types developed for copper can be adapted for use on aluminum cables.

Switching . . . Whipping action of the arcing horn was described by E. J. Field, R&IE Equipment Division of ITE Circuit Breaker Co, as the key to arc extinction performances of a simple, cheap, and effective device that can open up to 60 miles of 25-kv circuit.

At 4 kv the unit substation is the most economical distribution substation for all but the smallest ratings, John V. McGuire, Allis-Chalmers Manufacturing Co, reported. At 12 kv the picture is not so clear cut. Here the dividing point is with ratings of about 5,000 or 7,500 kva, he said.

PRINCIPAL SPEAKERS at the general session of American Gas Association—Edison Electric Institute Accounting Conference held in New York City were Charles E. Oakes, president, Pennsylvania P&L, Kinsey M. Robinson, president, Washington Water Power, E. R. Eberle, Public Service E&G, Allan H. Mogensen, industrial consultant, and O. K. Boyd, Consolidated Gas Electric Light & Power of Baltimore

Extra Effort Asked to Combat Socialism

Robinson appeals to accountants to win consumers, voters to utilities' side in fight against federal power

Accounting departments, by putting forth extra effort, can win the consumer and voter "to our side," Kinsey M. Robinson, president of the Washington Water Power Co, recently told 1,200 delegates to the American Gas Association-Edison Electric Institute Accounting Conference in New York. This will go a long way in contributing to the "ultimate success" of combatting the many socialized projects over the nation, he said.

Makes Appeal . . . Asserting that "you can't make believe while a world force called socialism is eating its way toward you," Robinson appealed for "extra effort" against federal power competition.

He told the utility accounting executives that "public relations needs the sort of balance wheel you can offer," and he emphasized that the effect of government propaganda on utility public relations "must never be underestimated."

Specific items which amount to $105 million are spent each year for direct propaganda purposes in government, Robinson stated. He went on to say that if hidden costs are counted, "including diversion of executive salaries to publicity, travel, speeches, letter writing, pamphlets, and the like," and with the addition of the output of 150 separate government printing plants in seven major cities, the costs of government propaganda, as estimated by Congressmen, mount to the $1 billion mark.

Free Institutions Impaired . . . In a similar vein, Charles E. Oakes, president of the Pennsylvania Power & Light Co, spoke of the "competition between ideological forces which has had such a destructive effect on our industry." He cited "determined political efforts aimed at socialization piercing the economy in all directions, which have seriously impaired the health of our free institutions." In the utility industry, he said, "the damage has already been great, for the work of infiltration has been going on determinedly for the past 20 years."

Of the activities of such agencies as the Tennessee Valley Authority and the Interior Department, Oakes said, "Here is competition in its most destructive form. Those thinking people who wish to preserve our national heritage for generations to come must become more articulate and resist such competition of government with its citizens at every hand."

Hodge-Podge Tax Picture . . . Turning to the tax picture, he said that "the country's present tax structure is a hodge-podge which has arisen by a compromise of competitive ideas. The electric utilities pay four times as much taxes expressed in percent of the revenue dollars as do the merchandise chains. The impact of taxes thus becomes a major issue for our industry."

In a progress report on the "Revision of Classification Accounts," O. K. Boyd, Consolidated Gas Electric Light & Power Co of Baltimore, said that the National Association of Railroad and Utilities Commissioners had adopted well over 90% of the suggestions made by the AGA-EEI special committee. He said that the committee will meet again with the NARUC in June at Philadelphia.

The problem involved in "Development of Management Employees" was discussed by E. R. Eberle, Public Service Electric & Gas Co. He told of his company's experience with a cadet training program designed to provide replacements for the anticipated openings in the executive ranks.

Today in Utility Finance

YIELDS (%)

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1952									
April 10	**2.94**	**2.97**	**3.11**	**4.05**	**4.34**	**4.64**	**5.34**	**6.01**	**6.46**
April 3	2.95	2.98	3.11	4.09	4.26	4.65	5.33	6.03	6.49
1st 1952	2.95	2.99	3.13	4.11	4.39	4.66	5.35	6.03	6.47
4th 1951	3.02	3.07	3.21	4.32	4.50	4.91	5.42	6.18	6.84
3rd 1951	2.87	2.91	3.04	4.05	4.27	4.61	5.59	6.24	7.05
2nd 1951	3.02	3.11	3.23	4.11	4.37	4.68	5.73	6.38	7.37

Data: Reis & Chandler, Inc.

EARNINGS

Company	Period Months	Ended	Net Income 1952	Net Income 1951	Earnings Per Common Share 1952	Earnings Per Common Share 1951
California Oregon Power	12	Feb.	$2,338,402	$2,316,858	$	$
Dallas Power & Light	12	Feb.	3,512,756	3,177,969	....	....
El Paso Electric	12	Feb.	1,465,494	1,386,357	1.84	1.73
Georgia Power	12	Feb.	10,131,845	9,289,084	....	....
Houston Lighting & Power	12	Feb.	7,300,265	6,471,157	....	....
Minnesota Power & Light	12	Feb.	3,338,677	3,348,831	3.22	3.23
Pacific Power & Light	12	Feb.	3,788,451	3,251,000	....	....
Texas Power & Light	12	Feb.	6,471,644	5,591,981	....	....
West Penn Electric, consolidated	12	Feb.	10,925,494	11,683,424	3.10a	3.31a
			1951	**1950**	**1951**	**1950**
Florida Power & Light	12	Dec.	$6,706,731	$6,394,554	$2.50	$2.43
Jersey Central Power & Light	12	Dec.	2,560,554	2,723,802	....	....

NOTE—The figures shown for the last two companies have been audited.
a—On 3,520,000 shares outstanding.

FINANCING

Company and Description	Amount of Offering (000)	Offering Price	Yield to Public
WEEK OF APRIL 10-16			
Bonds			
Wisconsin Power & Light—1st mtg 3¼% 1982	$7,000	100.76%	3.21%
Common Stock			
Southern California Edison—800,000 sh	$27,200	$34.00	5.88%
WEEK OF APRIL 17-23			
Bonds			
Alabama Power—1st mtg 1982	$12,000	.....	.....
Preferred Stock			
Wisconsin Power & Light—15,000 sh 4.80% cum (being offered to preferred stockholders, record March 31 to expire April 21, subject to allotment in the case of oversubscriptions)	$1,500	$101.50	4.73%
Common Stock			
Interstate Power—345,833 sh (being offered to commonholders on 1-for-6 basis (a), record April 4 to expire April 18)	$2,991	$8.65	6.94%
Wisconsin Power & Light—288,208 sh (being offered to commonholders on 1-for-7 basis, record March 31 to expire April 21)	4,943	17.15	6.53
Carolina Power & Light—200,889 sh	.....	.....	(b) .....
Gulf States Utilities	5,000(c)	.....	.....
Tucson Gas, Electric Light & Power—140,000 sh	.....	.....	(d) .....
SCHEDULED FOR APRIL-MAY			**Bid Date**
Bonds			
Union Electric Co of Missouri—1st mtg 1982	$30,000	.....	April 29
Texas Electric Service—1st mtg 1982	8,000	.....	May 6
Texas Electric Service—debentures 1977	5,000	.....	May 6
Iowa Power & Light—1st mtg 1982	8,000	.....	May 21
Preferred Stock			
Dallas Power & Light—100,000 sh $100 par	$10,000	.....	May 26
Common Stock			
Indianapolis Power & Light—196,580 sh (being offered to commonholders on 1-for-7 basis (a), record April 10 to expire April 24)	$6,831	$34.75	5.76%
South Carolina Electric & Gas—417,719 sh (being offered to commonholders on 1-for-5 basis, record April 15 to expire May 1)	4,021	9.625	6.23
New England Electric System—920,573 sh (to be offered to commonholders on 1-for-8 basis, record May 8 to expire May 26)	.....	.....	May 8
New York State Electric & Gas—300,000 sh	.....	.....	(e)May 14
Iowa Power & Light—226,928 sh (to be offered to commonholders on 1-for-7 basis, record May 14 to expire May 28)	.....	.....	.....
Wisconsin Electric Power—702,486 sh (to be offered to commonholders on 1-for-5 basis)	.....	.....	.....

Notes—(a) Stockholders are allowed oversubscription privileges; (b) Merrill Lynch—R. S. Dickson & Co, underwriters; (c) Enough common shares will be sold to yield $5 million; (d) Blyth & Co—First Boston Corp, underwriters, and (e) First Boston Corp, underwriter, if stockholders vote May 1 to waive their pre-emptive rights.

CALENDAR

Illuminating Engineering Society
Southern Regional Conference, Hermitage Hotel, Nashville, Tenn., April 20-22; Canadian National Conference, Hotel General Brock, Niagara Falls, Ontario, Can., April 30-May 2; Great Lakes Regional Conference, Hotel Statler, Cleveland, Ohio, May 5-6; East Central Regional Conference, Webster Hall Hotel, Pittsburgh, Pa., May 21-23; Northeastern Regional Conference, Hotel Preston, Swampscott, Mass., June 19-20.

Rocky Mountain Electrical League
Spring Conference, Shirley Savoy Hotel, Denver, Colo., April 21-22.

American Wood-Preservers' Association
Annual Meeting, Hotel New Yorker, New York, April 21.

Southeastern Electric Exchange
Annual Conference, Boca Raton Hotel, Boca Raton, Fla., April 21-23.

* **Pennsylvania Electric Association**
Spring Meeting, Hydraulic Power Committee, Penn Harris Hotel, Harrisburg, Pa., April 22-23; Communications Committee, Americus Hotel, Allentown, Pa., May 1-2; Spring Meeting, Relay Committee, Lawrence Hotel, Erie, Pa., May 8-9; Electrical Equipment Committee, Hotel Roosevelt, Pittsburgh, Pa., May 15-16; Spring Meeting, Systems Operation Committee, Allenberry Lodge, Boiling Springs, Pa., May 22-23; Spring Meeting, Transmission-Distribution Committee, Irem Temple Country Club, Dallas, Pa., May 22-23; Spring Meeting, Prime Movers Committee, Tidewater Inn, Easton, Md., May 28-29.

Pacific Coast Electrical Association
Business Development Section Conference, Hotel Huntington, Pasadena, Calif., April 24-25.

American Public Power Association
Spring Convention, Hotel Olympic, Seattle, April 28-May 1. Joint Meeting with Northwestern Public Power Association, April 28.

American Institute of Electrical Engineers
Northeastern District Meeting, Arlington Hotel, Binghamton, N. Y., April 30-May 2; Summer General Meeting, Hotel Nicollet, Minneapolis, Minn., June 23-27.

* **Electrochemical Society**
50th Anniversary Meeting, Benjamin Franklin Hotel, Philadelphia, Pa., May 4-8.

* **Edison Electric Institute**
Electrical Equipment-Prime Movers Committees, Edgewater Beach Hotel, Chicago, May 5-6; Association of Edison Illuminating Companies, Meter-Service Committees, Edgewater Beach Hotel, Chicago, May 5-7; Transmission-Distribution Committee, Edgewater Beach Hotel, Chicago, May 6-7; Hydraulic Power Committee, Edgewater Beach Hotel, Chicago, May 6-7; Purchasing-Stores Committee, Roosevelt Hotel, New Orleans, La., May 11-14; Accident Prevention Committee, Indianapolis Athletic Club, Indianapolis, Ind., May 22-23; 20th Annual Convention, Cleveland Public Auditorium, Cleveland, Ohio, June 2-4.

National Electrical Manufacturers Association
4th International Lighting Exposition-Conference, Industrial-Commercial Lighting Equipment Section, Cleveland Public Auditorium, Cleveland, Ohio, May 6-9.

Northwest Electric Light & Power Association
Engineering-Operation Section, Rainbow Hotel, Great Falls, Mont., May 7-9; Business Development Section, Chinook Hotel, Yakima, Wash., May 12-14; Personnel Section, Vancouver Hotel, Vancouver, B. C., May 19-21; Accounting-Business Practice Section, Medford Hotel, Medford, Ore., May 22-23.

Public Utilities Advertising Association
Annual Convention, Hotel Radisson, Minneapolis, Minn., May 8-9.

* Addition this week.

PUBLIC RELATIONS & ADVERTISING

An Ad Puts A Question to All Americans

The above advertisement will ask millions of Americans an important question as to whether they want the federal government to spend their tax money for a power project which Idaho Power Co is willing to build. The ad is being sponsored by the Electric Companies Advertising Program. The insertion schedule follows: "U. S. News," April 8; "Saturday Evening Post" and "Colliers," May 10; "Pathfinder," May 14; "Look," May 20, and "American Magazine," May.

Annual Report Highlights

Central Illinois Light Co on its back cover carries a letter of appreciation from a woman who has been a customer for 50 years . . . **Pacific Gas & Electric Co** reports over $800 million spent on postwar construction, largest program of its kind ever undertaken by a similar utility . . . **California Oregon Power Co** carries "The Copco Code of Business Ethics" and lists 31 highlight accomplishments for 1951.

Southern California Edison Co has an interesting center spread, "Comparative Statistics of Progress, 1942-1951." . . . **Middle South Utilities** uses unique cover to show territory served . . . **California Electric Power Co** says, "California has just emerged from heavy rains and snows that in some places have established new 60-year records. This wet winter is a welcome relief to the Southwest. . . ."

Iowa Power & Light Co dedicates its report to the progress of "Main Street —Ipalcoland."

Customers' Views...

. . . are transmitted to Black Hills P&L by advisory committee of 12 community leaders

One way for a utility to keep in touch with its customers is to appoint a committee of them to consult with management. Black Hills Power & Light Co, Rapid City, S. D., has been doing that for three years.

The company has selected a 12-man group from among community leaders in its area. Selection was wide enough to assure territory-wide representation. Eleven different businesses are also represented.

The advisory committee meets on call by the company president. The executive committee of the board often attends these meetings. The committee makes recommendations to management which is free to accept or reject them or to put them before the board of directors.

Close cooperation with the committee is company practice. The committee is furnished limited operating data and receives all information furnished the stockholders. Local and district managers keep in touch with the members in their areas, and general office personnel often visit them.

In turn they inform company personnel of any complaints they hear of company service, personnel, or practices. Often they have valuable advance knowledge of industrial and commercial developments.

During legislative sessions they sometimes have inside information on legislation affecting the company and can usually be helpful in passing along to the legislators information regarding the effect of legislation on the company's operations.

Is It Worth a DAM?

A booklet describing the evils of public power and its costliness to the taxpayer is now available for general distribution. "Is It Worth a DAM?" is its title. It was written in a light, semi-humorous vein by Peter L. Schauble, a retired vice president of public relations for the Bell Telephone Co of Pennsylvania. The booklet is being distributed by Bozell & Jacobs, 2 West 45th Street, New York 36, N. Y. The price is 5¢ a copy.

Here's the Meat of EEI Sales Conference

General sessions get the news headlines, but the day-by-day work of selling is covered in the section meetings. "How to" talks and discussions provide material for improvement of sales promotion in all fields of electric service

Home Service Conference

School Programs . . . Practically complete education in the technique of promoting electrical living among school teachers and students was given in a symposium on that subject. Participants were: Jane Grau, Duquesne Light Co; Lucy T. Hanan, Consolidated Edison Co of N. Y. Inc; Edith Hitchcock, Alabama Power Co; Elizabeth Parker, Georgia Power Co; Mary E. Turner, Potomac Electric Power Co; Harriet G. West, Indianapolis Power & Light Co.

First objective of Duquesne Light's school program, said Miss Grau, is to interest more students in taking home economics courses. To this purpose, clinics are conducted for girl high school students during assembly periods.

Second purpose is to enlist school officials in modernization programs of home economics classes. This is done by offering training to teachers in workshops conducted in the company's home service department in four two-hour meetings which include dinner—electrically prepared in a cooking demonstration.

Third objective, that to which the first two are directed, is to prepare the young homemaker to take her place in the modern world of electrical living.

Consolidated Edison centers its school programs on lecture demonstrations offered to public, private, and parochial schools, colleges and school agencies, said Miss Hanan.

A letter describing and offering a specific lecture is sent to school principals or other officials. The number of lectures given in any one school varies with its size, varies from one to 25. The lectures are also available and have been presented to schools of practical nurse training and of interior decoration, parent-teacher associations, mothers' clubs, and other groups.

During 1951 the Alabama Power Co conducted a total of 1,148 demonstrations with an attendance of 29,745 in its educational program. In order to reach the 254 high school economics departments in the company's service territory with a uniform program, reported Miss Hitchcock, "we asked the state supervisor of that work to consider a planned program of demonstrations which could be conducted in the home economics departments of the schools. Seven demonstrations covering all phases of electrical living were prepared and presented to the supervisor and her staff members. Visual education aids to complement the demonstrations were also presented. The entire program was approved."

Describing the school operations of the Georgia Power Co, Miss Parker said that each district home economist is charged with the responsibility of contacting the high school homemaking departments in her area. She endeavors to make these contacts as soon as possible after the opening of school in the late summer or early fall.

"Our interest in this contact is three-fold. We are concerned with the equipment, the teacher, and the student.

"1. Equipment—All electrical equipment in the department is thoroughly checked to determine its operating condition. If repairs or replacements are necessary, proper channeling is done. Recommendations for additional purchases are discussed and sources given. School purchese plans are reviewed or explained.

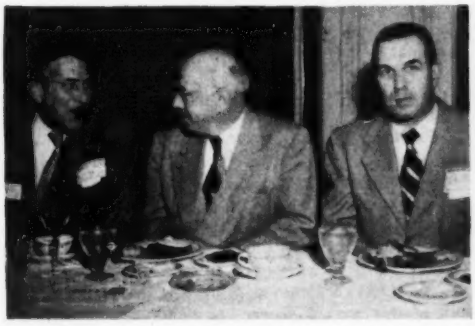
"2. The teacher—Obviously it is important that the homemaking teacher understand and appreciate the electrical equipment in her department. On the original visit, the home economist checks carefully to insure proper appreciation of equipment, and gives any necessary instructions.

"3. The students constitute one of our most powerful potentials. We offer demonstrations to each homemaking class on the occasion of the first contact with the teacher.

Elizabeth Williams, Monongahela Power Co; Jane Grau, Duquesne Light Co; Lucy L. Hanan, Consolidated Edison Co of N. Y.; Evelyn Hanson, Utah Power & Light Co; Elizabeth Parker, Georgia Power Co; Mary E. Turner, Potomac Electric Power Co; Harriet G. West, Indianapolis Power & Light Co assembled in panel for discussion of school programs

Miss Mary Dodds, Toledo Edison; Miss Willie Mae Rogers, Admiral Corp; Miss Mary Riedel, Proctor Electric Co; Miss Beatrice C. Ness, Cleveland Electric Illuminating Co.

Mrs. M. B. Christe, Black Hills Power & Light Co; Mrs. Elizabeth Wilson, N. Y. State Electric & Gas Co; Mrs. E. V. Wiese, Public Service Electric & Gas Co; and Miss R. C. Barr, New Jersey Power & Light Co.



R. J. Miller, Cleveland Electric Illuminating Co; R. K. White, Crosley Corp; E. O. George, Detroit Edison Co.

R. L. Brooks, Georgia Power Co, and T. J. Newcomb, Westinghouse

The school program of the Potomac Electric Power Co was planned for the home economics department of the high schools of Washington and two counties served in nearyby Maryland, Miss Turner reported. It has the approval of the city and county school boards. At the fall teachers' meeting each year the program is brought to the attention of the teachers by the head of the home economics departments in the Washington schools, and they are urged to take advantage of the service. In the schools in the two counties of Maryland the individual school principals are contacted in the early fall and appointments are made with the home economics teachers for the lecture-demonstrations selected.

Indianapolis Power & Light Co concentrates its school program on training home economics teachers, said Mrs. West, in cooperation with the local electric league. This was done in 1951 by means of an "Electrical Living Institute" in four two-hour sessions on consecutive Monday afternoons starting September 10.

Home Service and the Health Home . . . How the electrical industry is organizing to deal with the problem of the handicapped housewife was told by Harry Restofski, West Penn Power Co. About 13.5% of all homemakers are unable to carry out normal household duties.

Working on the problem now are task committees representing EEI, NEMA and the American Medical Association. Their purpose is the eventual formation of a "Health Home Council." A concurrent development is the establishment of the "Handicapped Homemakers Foundation," with the objective of raising $50,000 to underwrite research on energy-saving devices and methods of electrical nature.

How to Train Salespeople . . . Backed by an elaborate display of electrical housewares, Vivian Overand, Westinghouse Electric Corp, described the technique of training salespeople to tell the complete sales story to prospective buyers. First, with a flatiron, Miss Overand showed how the salesperson should bring out all the advantages of the product to the customer. Then, with ten roasters filled with tempting examples of roaster cookery, she illustrated the method of training large groups in how to sell that appliance.

Evaluating Home Service TV Programs . . . As a means for showing homemakers the values of electrical living, television has no peer as respects high effectiveness and low cost. This is the only conclusion that could be taken from three papers on evaluating home service TV programs by Florence Neely, Consolidated Gas Electric Light & Power Co of Baltimore; Louise Leslie, Harvey & Howe Inc, home economics counselors; and Esther dee Bride, Union Electric Co of Missouri.

"At first glance television seems very expensive. It is certainly far more so than the average demonstration. We figure the unit cost of each half-hour to be approxi-

mately $500. The estimate made by the station of the ratio of people who write in to a program such as ours to the number of those who watch but do not write is 1 to 50 on a conservative basis; our mailing list of 2,000 resulting from viewer response would indicate an audience of 100,000. Being ultra-conservative and considering an audience of only 50,000, cost is only one cent per person per week.

From her experience in conducting the network television program, "Homemakers Exchange," for over two years, Miss Leslie gave answers to a number of questions previously submitted to her. She reported that women viewers like an honest and forthright approach, dislike high pressure, "forced-down-the-throat" selling. Judging from viewer response, late afternoon is the best time for a home service program. The effectiveness of television is indicated by the return of 35% in a survey made by Harvey & Howe among viewers of the "Homemakers Exchange" program.

Miss Bride told of the growth of television home service programming in St. Louis, how the power company worked with the TV station in organizing production of the show, "Homemaking with KSD-TV," and getting it established.

The show established, Miss Bride next turned her attention to the task of making the local electrical trade more "television-minded." And she did. Early in 1950 there were eight electrical sponsors of TV advertising weekly. By January, 1952, there were 29 electrical sponsors of both network and local shows, increasing the number of impacts per week from 11 to 102. It is estimated that the value of this publicity for electricity-consuming devices is more than $25,000 per week, many times the cost.

New Horizons for Home Service . . . Speaking at the home service breakfast meeting, F. A. Compton, Detroit Edison Co, said there should be a re-examination of the activities of utility home service departments. In the operation of these departments, certain functions have developed which, while desirable in many respects, are not really necessary and which have become quite costly in time and money. With the growing amount of work directly concerned with sales promotion and customer relations, these functions should be limited or eliminated entirely.

R. L. Brooks, Georgia Power Co and T. J. Newcomb, Westinghouse; Lou Brettner, Reddy Kilowatt Service; Reddy Kilowatt; Tom Smiley, Carolina Power and Light Co.

Residential Sales Section

As an Appliance Dealer Sees Us . . . In its own interest, the utility should help the dealer sell appliances. Logically, the dealer looks for more help from the utility than from the distributor of goods on his sales floor. On this thesis, Al Robertson, Oklahoma appliance retailer, outlined what the utility should do for the dealer. Have a definite dealer cooperation program and really work at it. Promote effective window displays in dealers' stores. Advertise appliances, not just in a general way, but in specific terms. Don't just offer sales training to dealer personnel; bring them in and make it attractive to them. Set up some kind of a dealer organization for the interchange of selling ideas and for planning co-ordinated sales activities There are many other ways to help the dealer that the utility will find if it really tries to do so.

The New World Home . . . The New World Home is not the first home in America that is light-conditioned; it is not the first home air conditioned by means of a heat pump; or that has a kitchen of tomorrow; or that has certified adequate wiring; or that has a low voltage wiring system; nor is it the first all-electric home built by a merchant builder for sale to some unknown family. "But," said Robert L. Coe, Union Electric Co of Missouri, "so far as we can determine it is the first home in America that combines under one roof all of these features." (See Electrical World, March 17, page 38.)

Radio and television publicity, plus more than 15,000 lines of newspaper advertising, attracted more than 23,000 people to the home in a four-week period. The total cost of this promotion was less than $15,000, including everything. Not many homes so thoroughly electrified are expected to be constructed immediately. But the effect in promoting better lighting, kitchen improvement, heat pump interest, all aspects of electrical living, was quickly apparent.

To Know Is to Sell . . . Reminding his hearers that appliance sales are now off at least 30%, possibly up to 50%, from the first quarter of 1951, R. J. Miller, Cleveland Electric Illuminating Co, chairman of the Sales Personnel and Training Committee, announced a new training course for retail appliance salesmen. The course is offered in a complete kit of six units, each consisting of record, film, trailer, salesman's manual, and leader's guide. The first unit deals with opportunities open to the appliance salesman. The second covers buying decisions. The third shows how to use buying motives. The fourth tells how to develop prospects. The fifth gives instruction in demonstration of appliances. The sixth is devoted to closing the sale. The course can be used for retraining present salesmen as well as training new ones. Or certain sequences can be used to instruct salesmen on specific sales presentations.

Volume Sales of Water Heaters . . . For volume sales of electric water heaters the first requisite is an unqualified desire for the business. "You gotta want it," was the vernacular phrase used for emphasis by John H. K. Shannahan, Indiana and Michigan Electric Co, as he told about the success of his company in raising water heater saturation to over 30% in 1951 from 10% in 1946, and that in the face of vigorous gas competition. Along with a real

desire for the business, there are required a competitive rate, adequate service entrances, and good public relations.

In 1950, water heater sales were increased over the preceding year by nearly 50 percent and in 1951 continued at a slightly lower level. "We approached 1950," said Mr. Shannahan, "with the desire to secure more water heaters than ranges so that we could bring the saturation of the two appliances closer together with the consequent improvement in load factor. Up to this point, ranges had always carried a little more emphasis than water heaters. It was considered the leader—the door opener, so now we wanted to close a little of that gap. Basically, our program in '50 and '51 was simply to give the water heater a greater share of our sales promotion dollar and sales promotion effort and this was carried out in all phases of our activity."

You Can Use It . . . "If we, as major elements of this electrical industry, don't get busy and parade the benefits of electrical before the American public, they're likely to start watching another parade." That warning was given by Will T. Clark, Cleveland Electric Illuminating Co, as reason for utilities to buy and use the sales tools provided by the Electric Kitchen and Laundry Committee, of which he is chairman. There is an advertising kit containing 18 pieces of photographic art, copy suggestions and layout patterns that can be used as is or adapted to local ideas. Number two among the sales tools is a comic book depicting the joys of young romance in electrical living, available for distribution by utilities and dealers. For use with the comic book are an attractive dispenser and a kit of copy for radio promotion. Finally, there is a new full color, sound movie, 25-minute length. **"A Young Man's Fancy"** is its title and, of course, the young man's fancy inclines definitely towards electrical living.

NEMA Promotion Programs . . . T. J. Newcomb, Westinghouse Electric Corporation, chairman of the major appliance division of NEMA, called for coordination of advertising and promotional efforts between electric appliance manufacturers and the electric light and power industry.

"Individual manufacturers should be (and in many cases are) doing the job at both the consumer and industry levels," said Mr. Newcomb. "Electric light and power companies are doing the job locally in their own territories at the consumer level. The thought to bear in mind is that to get the most out of all these efforts, they must be coordinated. To gain full advantage of them, they must be followed up at the point of sale." He then outlined the 1952 advertising and promotional plans of the major appliance sections of NEMA.

Mr. Newcomb also explained how the utilities can participate in the electric housewares gift campaign, sponsored by that NEMA section. He urged that their sales forces and home service people work closely with local dealers, distributors, and area committees to support the campaign in their own communities. A pre-tested blueprint for helping dealers capture extra gift business is provided, he pointed out, in the industry's current 32-page Retail Sales Plan Book, containing "practical selling ideas for displays, newspaper advertising, gift wrapping, and other easy-to-do and inexpensive promotional techniques."

Electric League Values for Utilities . . . The value of the electric league to the utility is very great, asserted J. S. Bartlett, Potomac Electric Power Co. The league can be

C. I. Dwinell, Cambridge Electric Light Co; Richard Weis, Colonial Premier Co; H. A. Stroud, Monongahela Power Co; Mike Freyer, Colonial Electric Co.

Miss Loreen Jacobson, Wisconsin Power & Light Co; Miss Julia Kiene, Westinghouse; Miss Celeste M. Sullivan, Illinois Power Co.

R. E. Johnson, Nelson H. Randall and H. K. Jorris, all of Toledo Edison Co and E. B. Bentley, Cincinnati Gas & Electric Co.

A. D. Hinckley, IES; R. L. James, Pennsylvania Power Co; Rusty Bell, Commonwealth Assoc.; W. G. Hills, Electric Institute of Washington.

Orrin E. Wolf, Hotpoint, Inc; L. F. Kielsmeier, Ohio Edison; Glen S. Young, Kansas City Power & Light Co and Willard Brown, General Electric Co.

John Talley, Southeastern Electric Exchange; C. W. Ailstock, Florida Power Corp; W. P. Lyman, Carolina Power & Light Co and T. D. Fulford, Virginia Electric & Power Co.

a potent factor in improving public relations, since its members can have a significant influence on people's thinking. Identification of the utility with all branches of the local trade recognizes the interdependence of electrical interests. Through the league the utility can direct promotions with benefit to itself and to participating dealers. The utility can explain its problems to understanding minds and receive help towards solution of them. The league furnishes a common ground for interchange of information on marketing and many other matters of mutual concern.

Commercial Sales Section

Street Lighting . . . C. V. Doherty, West Penn Power Co, summarized his company's attitude on street lighting this way:

"Rates and Service. We feel that the rates should be designed to produce a profit but should be as low as possible, consistent with costs. We believe that service should be the best that can be furnished. Under no circumstances should it be curtailed to keep down costs—or for any other reason. Equipment should be modern, efficient, and well maintained.

"Promotion. Street lighting should be promoted—but revenue returns do not justify an elaborate setup. It is worthy of carefully prepared sales presentations, of occasional direct mail pieces, and of enthusiastic personal promotion on the part of our employees responsible for its development.

"Street lighting should be merchandised. We should not be content merely with filling orders. Efforts should be made to secure a true customer acceptance by selling benefits to the public as well as to the municipal officials.

"Planned programs should be the basis of sales presentations.

"We do not feel that the street lighting load on our lines will begin to approach the saturation point until the general public becomes thoroughly sold on the necessity for adequate street illumination—and until the municipal officials are able to secure some new sources of revenue other than real estate taxation."

All the manufactured items required for street lighting —luminaires, poles, brackets, transformers, and control devices—are being produced at a rate consistent with present demands, according to Hugh Estes, Electrical Equipment Division, NPA. How these will be utilized depends on ingenuity and engineering in matching them up with available copper to get the most in street lighting improvement. And circuit conductor requirements can often be met as well with aluminum as with copper.

In answer to his subject question, "What is NEMA Doing for Street Lighting?" W. H. Edman described the activities of the Street and Traffic Safety Lighting Bureau. The work of the Bureau has achieved nationwide recognition and sold the basic need of better street lighting to taxpayers. It has stimulated writers to delve into the subject and present it to the lay public in understandable fashion, as was done by the article in "This Week" last February 3.

During 1951 every daily newspaper in the United States carried one or more stories originated or instigated by the Bureau. This was the result from 58,613 releases sent to editors all over the country. Monthly releases to 1021 magazines in twelve different fields—chambers of commerce, educational, electrical, fraternal, home and family, insurance, motoring, public transportation, municipal, real estate, religious, and youth—totalled 21,797. Over 700 civic and other organizations receive information from the Bureau regularly. A new publication, "The Street Lighting Magazine," appearing quarterly, has a circulation of 12,000.

Market Development . . . Electric leagues and similar associations have promoted sales of electric appliances and service in the general and residential fields for many years. But it is not usual for them to be active in the fields of commercial and industrial service. This can be done with good results, said J. F. Gaskill, Philadelphia Electric Co, instancing the joint experience of his company and The Electrical Association of Philadelphia.

This experience began in 1927, when a cooperative campaign, on a trial basis, was initiated and carried on by manufacturers of a particular device and the utility. They cooperated in advertising, sales promotion, and closing. Another campaign was put on later and then another and all at once it was discovered that the Association offered a common meeting ground. Since then such commercial promotions have been under the aegis of the association in which there are now six definite groups covering

air conditioning, lighting, electric heating, electric cooking, ventilation, and ultra-violet applications. These groups meet continuously in the Association to plan their promotions and to iron out the many problems of sale and installation of equipment.

Commercial Cooking . . . "Swivel Chairs for Sale" was the title E. P. Werley, Pennsylvania Power & Light Co, chose for his talk on selling commercial cooking. Chairs are for sale because the PP&L boys don't have time to sit in them. Instead, they are out averaging three calls per food service customer per year. These calls were preceded and followed by 3.66 mail and hand-out prices per customer.

But the best sales tool is an ample stock of counter-line equipment for trial use—one for every 100 customers and that one is used 15 times a year. Better than 50% of these trials resulted in immediate sales and the final result was over 100% in ultimate sales—some customers making plural buys. For a year 'round cooking activity that included an "All-Electric Kitchen Club" incentive program, there resulted 47 all-electric commercial kitchens in one year. It was a good year, 1951. For dealers, it meant 54 pieces of equipment valued at $7200 sold to every 100 food service customers on the company's lines. For the company, it meant additional connected load of 210 kw with an EAR of $5,200 per 100 commercial cooking customers.

Where and how fast electric cooking is going in food service establishments were graphically shown by Walter Sormane, Hotpoint, Inc, in a series of charts. In 1949 electric was 16% of commercial cooking equipment sales; in 1951, 29%. In 1950 gas equipment sales increased 33% over the previous year, but was down 3.6% in 1951 from 1950. The electric increase, 1950 over 1949, was 59%, and 1951 over 1950, 167%.

From the utility standpoint, commercial cooking has few, if any, equals as a load and revenue builder. High load factor, 30% average; high diversity, coincidence rarely exceeding 50% of connected load. High power factor, straight resistance load. For every $100 cost of commercial cooking equipment the utility receives $70 EAR. There is no longer any question of user acceptance of commercial electric cooking. Just as surely as the gas industry took the commercial cooking market from coal and oil some 25 years ago, so will it lose that market to electricity.

Industrial Sales Section

Opening Remarks . . . Chairman Maxwell Cole, Philadelphia Electric Co, observed that sales opportunities in industrial power in 1951 were much greater than had been anticipated. From this, and in the light of present conditions, he concluded that "there is a real job ahead of us in developing programs to keep our sales volume at a satisfactory level."

Reviewing the work of section committees, he pointed to the growth of government and other subsidized competition, to the possibilities of power production from industrial wastes, and to the development of the "dual-fuel" engine. Improved techniques of metal fabrication have accentuated the importance of the welder service problem. The matter of emergency energy supply to theaters, hospitals, and critical industries is demanding consideration. Technological progress in industrial electric heating has compelled extensive revision and enlargement of these parts of the Power Sales Manual.

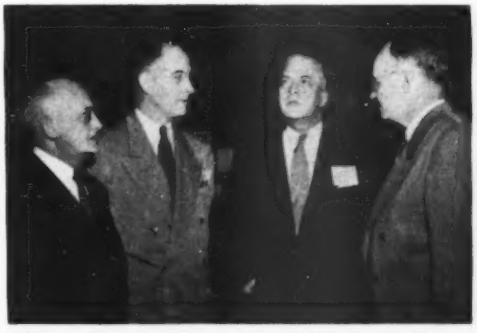
Management's View of the Power Sales Job . . . "The electric utility industry," Sherman R. Knapp, Connecticut Light & Power Co, said "is engaged in a serious battle for self-preservation against the advocates of government ownership. We believe that our battle is part of a broader battle for the preservation of our system of private enterprise against encroaching socialism which is a threat to the entire economy of this country.

"We cannot expect a sympathetic hearing by the public unless the public feels that its interest and ours coincide. The proof of that lies in how we carry on our day-to-day business and how we as companies and as individuals fulfill our responsibilities as citizens in our respective communities.

"Industrial power representatives are particularly well fitted by training, experience, and general outlook to play a significantly important part in attaining the objective of public understanding of our business."

Electric League in Industrial Business . . . "Since the cost of having a salesman make personal calls is high today, and going higher tomorrow, we are certain," said R. C. Hinton, Cleveland Electric Illuminating Co, "that our electrical league helps us to get better overall results, because when our manufacturers make more sales, then our distributors make more sales, and our dealers make more sales. As a net effect of this chain of increased sales, we sell more kilowatt hours, and since the customer always profits when he uses more electricity, the chain of benefits is complete. And that is why my company not only feels but knows that it is good business to support an electrical league."

Previous to this conclusion of his talk, Mr. Hinton told how the Cleveland league multiplied the effectiveness of his industrial power salesmen. The league publishes a monthly magazine which goes to the homes of 3,500 industrial executives. It describes industrial applications in the Cleveland area and suppliers of equipment advertise in it. The league holds technical meetings in cooperation with electrical manufacturers and puts on courses in the tech-



Dick Richard and Luther Cole both of Birmingham Electric Co; Streuby Drumm, New Orleans Public Service and Ed Wilson, Alabama Power Co.

D. O. Butkin, Indiana & Michigan Electric Co; B. S. Moss, Georgia Power Co; W. D. Hemker, Westinghouse and Joe Ditchman, General Electric Co.

On behalf of the farm section, John Burgan, New York State Electric & Gas Co presents a gift to chairman R. T. Jones, Pennsylvania Power & Light Co

niques of industrial electrical applications for employees of customers.

Electric Service in the Chemical Industry . . . Of especial interest in the paper by R. S. Clark,, Columbia- Southern Chemical Corp, were his remarks on standby service to industrials that produce their own power. In most cases, he said, it appears that utilities have no desire to furnish such service and this is understandable if it involves constant liability to meet sudden large demands. This problem might be solved by agreement to load such connections at scheduled times. If several such contracts were made, their scheduled loads might be integrated into one on the utility system. A block of capacity set aside for several such contracts might make possible rates attractive to the industrials and profitable to the utility.

See Better—Work Better . . . Except for changing from filament to fluorescent lamps, and the mounting of luminaires in continuous rows, there has been little or no change in what might be called the optical design of general industrial lighting fixtures since 1919 and the RLM reflector. True, the fluorescent lamp has much lower brightness than the filament lamp. But it is bright enough so that one does not normally use it bare in such places as offices, schools, etc., where eye comfort is important.

Yet, said Willard Brown, General Electric Co, the shielding of lamps in industry has not improved since 1919. For the average factory worker, many fluorescent lamps are visible from his work position. This causes discomfort in many cases. Why shouldn't factory workers have as comfortable seeing conditions as do their contemporaries in offices? Certainly their welfare is as important . . . and their comfort has been found to have a great deal to do with production results.

Therefore, several forward-looking fixture manufacturers are developing what amounts to a radically new type of industrial lighting fixture. This will have:

1. Better shielding of the lamps . . . 35° or 40° or 50° such as is common in office and school practice, rather than the 13½° of the conventional industrial fixture of the present day.

2. Plenty of upward light . . . 20% or 25% . . . combined, of course, with white paint in the ceiling areas of the factory.

3. High light output.

4. Design which will give minimum collection of dust and dirt on the fixture and lamp.

5. Light-colored or luminous sides to reduce harsh contrasts between inside of fixture and the relatively dark outer surface.

Farm Sales Section

Farm Electrification Clinic . . . Discussing the question, "Is standby farm power necessary?" E. D. Smith, Dayton Power & Light Co, posed four other questions growing out of that thought that standby is necessary in a given case. They are:

1. Does the risk really warrant the required investment?
2. How to protect line crews from possible feed back?
3. What is the best standby—engine generator unit or some form of portable engine drive?
4. How to assure that standby equipment will always be in shape to take the load?

Service records, said Mr. Smith, indicate that, in many areas, modern construction practices, radio communications with service crews, and "around the clock" service are adequate in preventing prolonged outages. In those areas, however, where cyclonic or severe sleet storms are likely to occur, there does not appear to be any practical way yet to remove the threat of long outages.

Public Relations and You . . . "I think that the preservation of our way of life is the greatest merchandising challenge that has ever faced America," said K. W. Haagensen, Allis Chalmers Manufacturing Co, Farm Section luncheon speaker.

The preacher, teacher, scientist, farmer, shopworker, all people in all walks of life are salesmen, only they don't know it. And usually, when it comes to appreciation of the society in which they live, they are salesmen of the negative, not the positive. That is, they talk much more about what is bad than about what is good in their jobs, businesses, and vocations. This makes it very easy for those selling communism to put their arguments across.

"What kind of salesman for America are you?" he asked.

The Years Ahead in Farm Electrification . . . Looking ahead in rural electrification, E. W. Lebmann, University

T. E. Hienton, U. S. Dept. of Agriculture; Frank Watts, The Farm Journal and K. W. Haagensen, Allis Chalmers Mfg Co, speaker at the farm section luncheon.

Sherman R. Knapp, Connecticut Light & Power Co; J. Reed Hartman, Cincinnati Gas & Electric Co; J. D. Sullivan, Battelle Memorial Institute and Max Cole, Philadelphia Electric Co.

of Illinois, said that it will be recognized that the coordinated and correlated efforts of all who are concerned are necessary to develop an effective program and attain the results desired on the farm. This must be accomplished at the farm level. It includes the farmer, his organizations, the colleges and experiment stations through the extension agents, the Vo-Ag teacher, the power suppliers, the manufacturer, the dealers—the implement dealer, the materials dealer, the electrical dealer, the general merchandiser, the electrician, the plumber, the contractor, the U. S. Department of Agriculture's representatives, the manufacturers, and organizations that represent these groups, the insurance people, and many others who either directly or indirectly contribute to the effective and safe use of electricity on farms.

Many groups that are now working alone, in the future will join hands to improve their services. As a result equipment will be improved and it will be available through qualified dealers. The mutuality of interests of the power suppliers, the dealers, the electricians, and a lot of others who are motivated by profit to sell power, to sell equipment, to install it, to service it, to plan buildings, and to insure them should prompt cooperation. The future of farm electrification is dependent not only on a thoroughly informed user, but informed educators, manufacturers, dealers, contractors, and others who serve. Most of the farmer's problems will be solved when all these groups are completely informed and tell the same story, and the work of one supplements the work of the other.

Vocational Teachers' Problems in Farm Electrification . . . About 10,000 schools in the United States now give instruction in vocational agriculture to some 400,000 boys and men. The training and experience of instructors of such courses does not generally include very much about electricity. The rapid growth of farm electrification makes it essential that their knowledge in this field be increased in pace with that growth.

How this is being done in various states was described by Louis M. Sasman, Wisconsin Board of Vocational and Adult Education. Today, the present and future farmer needs to know how to select, operate, and maintain electric motors and the wide variety of electrically operated appliances and machines now used on farms; how to use a welder to make emergency repairs; how to be sure that the wiring in his house and farm buildings will properly and safely carry the constantly increasing electrical load. Before they can offer instruction in these matters, the "vo-ag" teachers must receive it themselves. They get it in summer and other courses developed by teacher training institutions and utilities and other organizations of the electrical industry. Representatives of the industry are leading the way in many areas by assisting in the preparation of practical teaching material and by making equipment and supplies available to schools.

Lamps and Lighting for Farm Production . . . Renewal and conservation of the productive capacity of soil by mixing krilium into it, and acceleration of food animal growth by inclusion of antibiotics in feeds, promise much towards increase of food production. Ranking equally with these recently announced developments, said J. P. Ditchman, General Electric Co, is radiation of heat and light from electric lamps.

Radiation has already proved its case in the brooding of chicks and infant animals. It gives the farmer a control element that helps him adjust production marketwise free from weather limitations. Presently this advantage, now so convincing in the raising of slaughter animals, will be applied more generally to vegetable crops. In some areas radiation of field crops may very well become the most basic use of this technique. By trial and error we have gradually improved our theories about what we must do to control and stimulate the intricate processes of nature. We are now in possession of fundamentals about radiation in these processes and the ways in which they are affected by it.

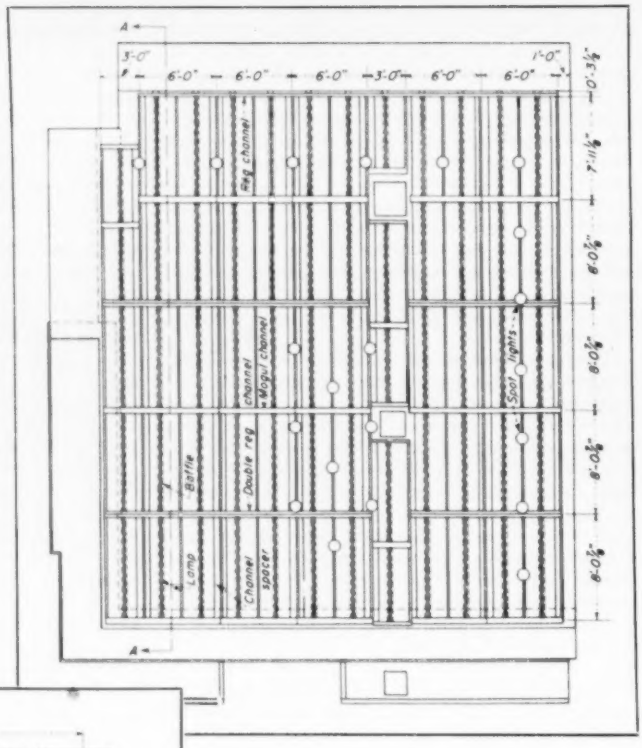
Farm Electrification Clinic . . . Radiant heat brooding, employing electric heating cable, is gaining popularity among Georgia poultrymen, who are leading all other states in the production of broilers, according to Bud S. Moss, Georgia Power Co. He reported that during the past two years 65 poultrymen in his state have built radiant heat brooders with a total capacity of 500,000 chicks. All of the brooders were planned by and installed under the supervision of Georgia Power rural engineers.

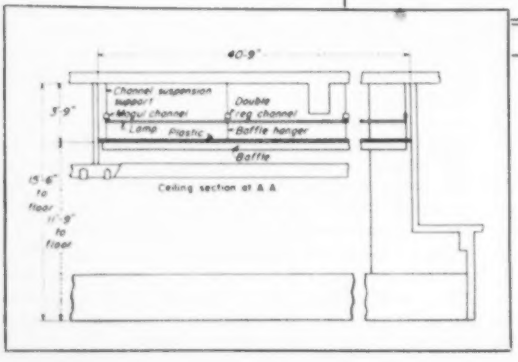
Moss said that radiant heat brooding can compete successfully with any other method on a cost of operation basis. Tests conducted by his division showed an average of ½ kwhr per chick. Electricity used per chick was never in excess of 1 kwhr in any brooder.

Best of PLANNED LIGHTING

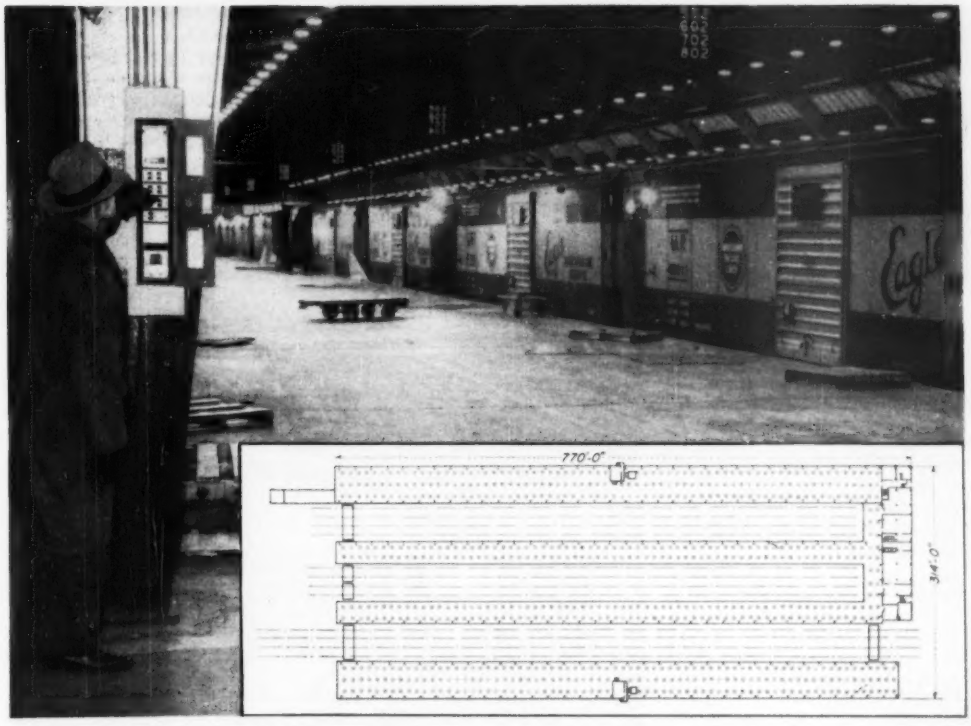
In Contest Entries

In the Gold Seal prize award competition for best lighting installations, a feature of the 8th International Lighting Exposition to be held this year in Cleveland, May 6-9, there were 330 entries. Singly or jointly with other competitors, 195 electric utility men are entered in the contest. From their entries, Electrical World here presents several that are representative of the quality of lighting design work done by the "Man Who Plans."

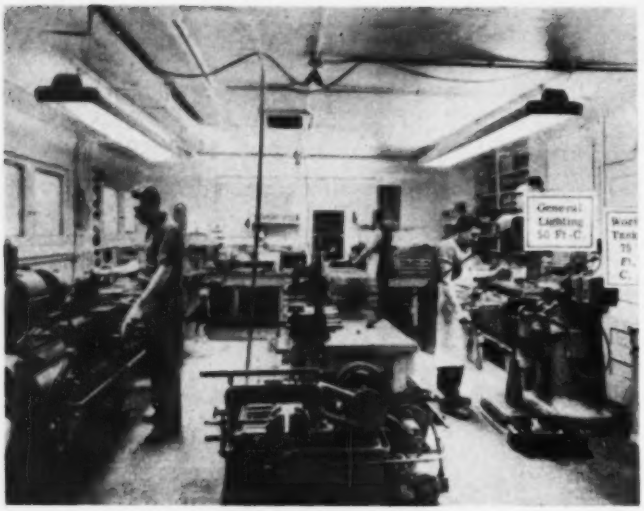


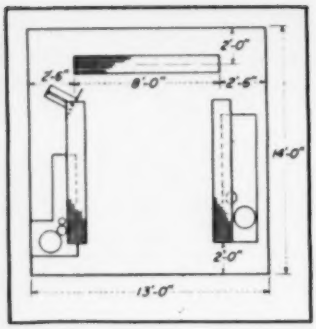


Designed for selling . . . Lighting design for this retail millinery and accessories store uses translucent ceiling of corrugated plastic panels with F 96 T 12/CW lamps spaced in continuous rows on 18-in. centers 18 in. above it. Accent lighting is supplied by adjustable louvered down lights using 150-w R-40 reflector lamps mounted flush with the plastic panels. General illumination is 125 ft-c and accent lighting 200 ft-c. *Entry submitted by Harry L. Nicol, General Electric Supply Corp. and Larry R. Nall, The Detroit Edison Co.*



Railroad freight station . . . Lighting was accomplished with ceiling mounted RLM dome reflectors with 500-w lamps and glass covers. Mounting heights are 20-25 ft in the center bays and 14-18 ft in the side bays. Spacing is 11-15 ft. Average intensity is 26 ft-c. Waybills, etc. are easily and quickly read on loading platforms. *Entry submitted by Roger W. Renkel, Union Electric Co, and E. W. Stohlman, Jr.*



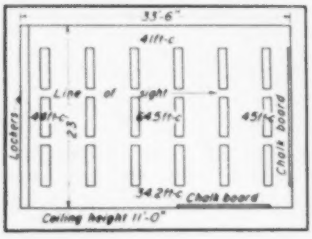


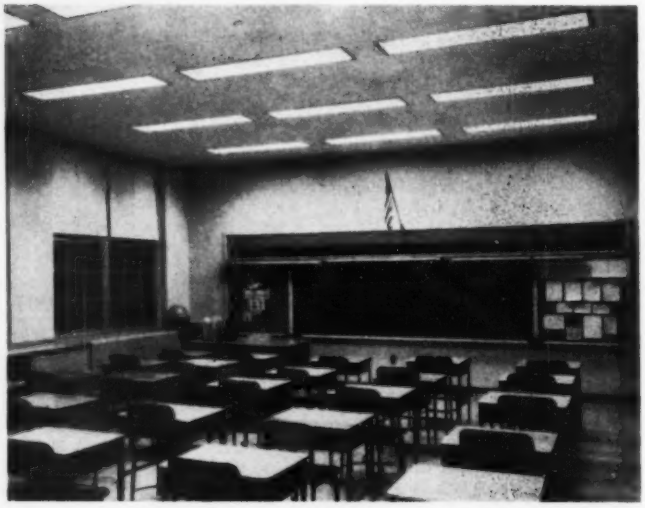
Machine shop . . . Owner reports better lighting brought ease of seeing, pride of craftsmanship, and higher production. Two-lamp standard cool white 75-w, T-12-430 ma slimline lamps in louvered fixtures produce average general lighting of 50 ft-c, 36 in. above the floor and 75 ft-c at the working edge of the machines. Brightness contrasts are balanced by painting the ceiling white, walls light grey, and machines light green. *Entry submitted by James F. Finn, The Detroit Edison Co.*

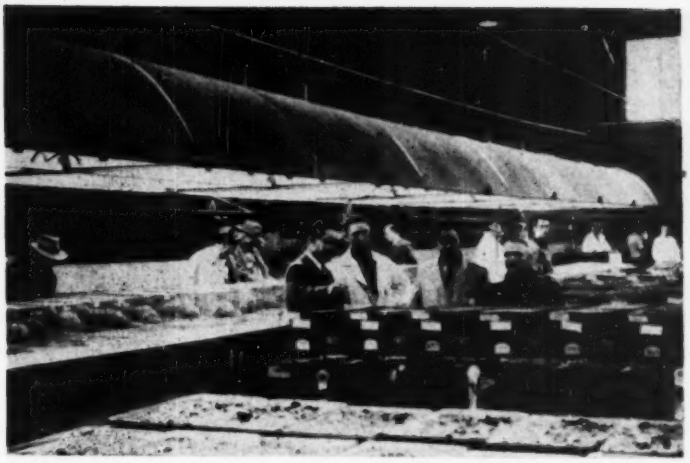
Another entry by Mr. Finn was the lighting design of a used-car sales lot. The installation is comprised of 64 spot, and 81 flood, Par 38, 150-w lamps, plus 122 200-w bare lamps spaced 30 in. apart in two strings 12 ft high. Maintained intensity on the sign is 75 ft-c and on front grilles of cars is 105 ft-c

Lamp replacement is the only maintenance required.

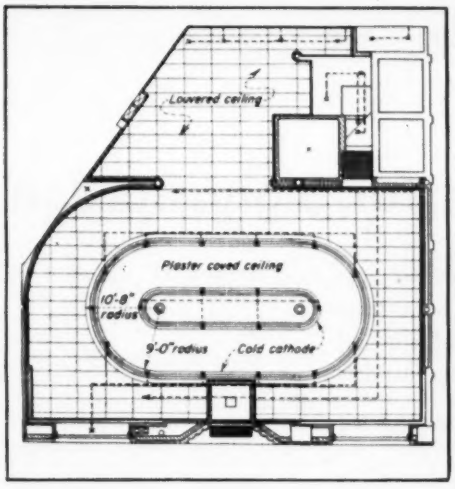
School . . . Lighting design for visual comfort with minimum maintenance used low-brightness aluminum troffers with longitudinal baffle to provide 25 deg crosswise shielding. Fixtures contain two 40-w, T-12, low brightness, 4500 deg white lamps and are recessed in ceiling. *Entry by Richard A. Masterson, Public Service Electric & Gas Co, with E. T. Brown, architect.*

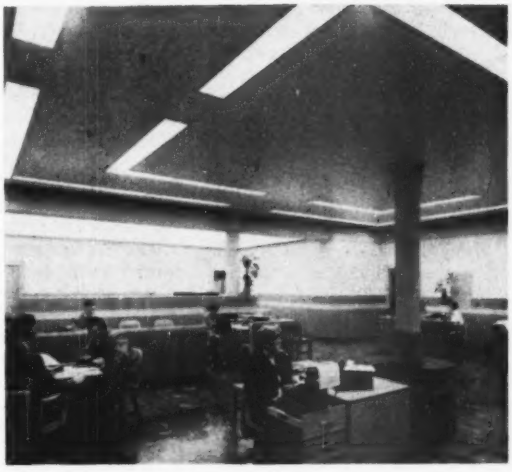






Judging . . . Fur-bearing animals show presented special problems. In the mink section of the show the solution was diffusing and color-correcting hood which redirects the light from 32, 1,500-w photoblue lamps spaced 2½ ft apart over an area 80 ft long. Due to patent negotiations all of the detailed specifications were not disclosed. *Entry submitted by Duncan Preston, The Detroit Edison Co.*





Bank lighting . . . Small and irregular area is illuminated by slimline strips supplemented by a variety of other units. Area contains reception and work area for the main floor of a central bank. Lighting was designed to produce a feeling of spaciousness. It provides 35-ft-c in customer area, 75 ft-c around perimeter of cove for cashiers and offices and 90 ft-c in the bookkeeping area. Cove lighting consists of 4 rows of 20 mm, 3500 deg white, cold cathode lamps operating at 60 ma, 12,000 v, in the center and perimeter coves. The louver ceiling which surrounds the oval of the cove lighting and extends back over the cashier and bookkeeping areas, is lighted by 2-lamp slimline units in 4, 6, and 8 ft lengths operating at 425 ma. In the mortgage department on the second floor 72-w, 96 in. and 55-w, 72 in. T-12 lamps in flush troffers with louvre bottoms provide 65 ft-c. *Entry submitted by Vincent D. Mitchell, Rochester Gas & Electric Co.*

PRINCIPAL of grade school gets explanation of BL-BS program before giving his approval

TEACHERS get an explanation of the course material from a representative of the local utility. This briefing plus BL-BS teaching aids makes it easy for the teachers to do better work

Better Light Better Sight Bureau

Bureau's programs are welcomed by principals and educators. Its educational aids are used to explain basic facts about light and sight. Teachers and members of staff of National Education Association aided in preparing projects

"Defective vision can be fought in only two ways. One is by correction of existing eyesight defects and proper care of the eyes. The other is by elimination of one of the main causes of eyestrain—inadequate lighting."

These words are quoted from the prospectus written 18 years ago when the Better Light Better Sight Bureau was formed, under the joint sponsorship of the Edison Electric Institute, General Electric Co, Westinghouse Electric Corp, and Sylvania Electric Products, Inc.

Today the bureau, oldest cooperative venture of its kind in the electrical industry, is still fighting its battle against inadequate lighting in factories, stores, schools, and homes.

Its job is pointing out the danger to eye health and comfort caused by poor light and making available, in non-technical language, facts about good lighting.

It would be hard to find a medium the bureau hasn't used, since 1934, in combating inadequate lighting. Booklets and folders have been the main weapons in the Planned Lighting Program, but there have been newspaper advertising, window and floor displays, slide-lecture demonstrations, movies and sound slide films, visualizers and radio commercials, counter cards, bill enclosers and more, much more. Not the least effective has been the bureau's 16-page magazine "Better Light Better Sight News," written for electric company customers, which has jumped 54% in paid circulation in the last two years.

Battle for a Generation . . . But the greatest and most worthwhile educational battle being waged by the bureau today against inadequate lighting is being fought in the minds of the school children of America. In this field the bureau is engaged in an activity whose full effects will not be felt for years to come. Its tools are a series of projects for instruction about light and sight. These projects are designed to fit into the regular instruction schedule and intended for presentation by the teacher.

Two such programs are now in use. The one is for pupils of the fifth and sixth elementary grades, the other for junior high school students.

These projects are prepared according to the latest educational techniques. They include such teaching aids as film strips, charts, study folders, teachers' guides, and other material.

The school programs make no attempt to sell lighting in any shape or form. If they did, many school administrators would bar their use. The projects simply present the same basic facts about light and sight, in terms that children can readily understand, that the bureau has preached.

Experience with the use of these programs has showed that a flatteringly high number of school principals consider this instruction worth the investment of their own school funds. Some very high percentages of

PUPILS take an active part in class lessons. Material is prepared and presented in such a way that children have no difficulty in grasping it. Modern teaching aids which are part of BL-BS program are often more advanced than those used in teaching regular school subjects

Takes Its Story to the Schools

JOHN H. RONAYNE, Manager, Better Light Better Sight Bureau

use of the projects among schools in given areas have been achieved by companies that limit their sponsorship of the programs merely to encouraging local schools to use them.

Why are electric utilities interested in such instruction? First, it is a public service helping to improve knowledge of good seeing habits. Second, it is an intelligent, long-term investment in the education of future utility customers.

More than 400,000 students throughout the country who so far have received this training will within the next few years work in stores, offices, and factories. They will teach school. They will live in their own homes. They will be electric company customers, and they will have some knowledge of the company's most widely used service before they fill out an application card.

Not Light Advertising . . . Teaching programs such as these must be far different from the advertising materials prepared to sell lighting. To make sure that these bureau projects would be acceptable to school administrators and to make it possible for any company to offer them to schools without fear of criticism, the bureau has in their preparation worked closely with the National Education Association.

Outstanding teachers and members of the NEA headquarters staff have seen these programs during all stages of preparation. Their suggestions have helped to determine the type of teaching aids to be included and the subjects to be covered. They have also suggested related class activities and methods to bring up the instruction to approved standards.

Very frequently the bureau serves as a source of information and aid to sight-saving agencies, eyesight specialists organizations, state councils for the blind, school authorities, and similar groups.

As an example, late in 1951, New York State requested experts in several fields related to light and sight to join a committee to examine present school lighting standards set by the state. The committee was asked to make recommendations to guide the Division of School Buildings and Grounds in planning school buildings for maximum visual efficiency.

Ralph Wagner, then bureau chairman, was invited to serve with representatives of the Illuminating Engineering Society, National Society for the Prevention of Blindness, American Institute of Architects, and other organizations. As a result of their conclusions new regulations to govern lighting arrangements in construction and remodeling of school buildings were issued by the state commissioner of education.

According to a bulletin issued by the Division of School Buildings and Grounds, these new regulations are "particularly significant in that they recognize adequate and proper artificial lighting as an acceptable source for classroom illumination."

New York is only one of many states in which the bureau has aided school authorities in a program to bring more and better light to the classroom. Such educational work will pay dividends for years to come. And it is one of the reasons that the Better Sight Bureau is getting increasingly heavy support from all the industry.

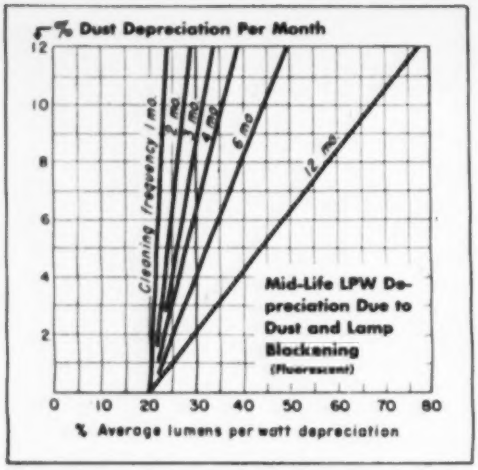


FIG 1—FLUORESCENT lamp and fixture depreciation that can be expected with one to 12 no cleaning intervals with DD rate up to 12%

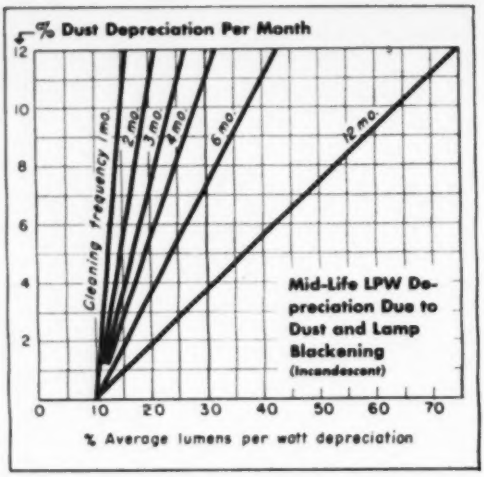


FIG 2—INCANDESCENT lamp and fixture depreciation that can be expected with one to 12 no cleaning intervals with DD rate up to 12%

It's Easy to Prove Planned Lighting Maintenance Pays

It's easy to prove that lighting maintenance pays specific dividends for any condition encountered in actual use. The author's charts are simple for non-technical consumers to use and eliminate time-consuming formulas and calculation

F. J. **VORLANDER,** Commercial Engineering Dept., Champion Lamp Works, Lynn, Mass.

Each year millions of dollars are spent for lighting installations. Within a year or two many are producing little more than half the light they provided when new. Few customers realize that unless fixtures are cleaned periodically and lamps replaced at proper intervals their installation will produce but 50 to 70% of its light capability. What is more they will be getting but 50 to 70% of the light for which they are paying.

Responsibility . . . It is as much the responsibility of the lighting engineer to sell the idea of good maintenance to the consumer as it is to sell good lighting. Probably the main reason the industry has done such a poor job selling maintenance is that it has been so difficult. In the past there has been no way to determine quickly and with reasonable accuracy the cost or value of such maintenance.

Although installations are usually planned on the basis that 70% of initial intensities will be maintained, consumers have not been maintaining them because they consider maintenance costly and a waste of manpower. In these days of manpower shortages it is important that we know how to show that planned cleaning is profitable rather than costly.

Data Needed . . . The greatest need of the lighting industry is data. These would be best in the form of charts, curves, or tables from which all customers, whether technically trained or not, could easily determine the economic value of maintenance for any installation. Such material must of necessity be simple to use. It must also provide for the following variables:

1. Rate of light depreciation due to dust.
2. Frequency of cleaning periods.
3. Labor rate.
4. Power rates.
5. Operating hours and total exposure hours.
6. Wattage of equipment involved.

Charts, Figs. 1 to 4, take all these factors into account. They are based on the following formula which is included here merely to illustrate the factors involved in the preparation of the charts:

Profit/Yr./Fixt. = DD (K F + Pr W T) − C

where DD = Average dust depreciation midway between cleaning and at lamp mid-life; K = percent annual amortization rate for total lighting installation cost per fixture; F = cost of one fixture and lamps; Pr = power rate in cents per kwh; W = total kw used by one fixture; T = hours of operation in one year; C = cents cleaning cost fixture/month.

Depreciation . . . From the moment lighting fixtures and lamps are in-

stalled or recleaned, they begin to gather dirt and the lamps begin to blacken. Depending upon the condition of the atmosphere of the surrounding area, the movement of air, the type of work, and many other variables, the dust accumulation varies. As a result, dust depreciation is not a constant figure even in the same area and under the same working conditions, except possibly in air-conditioned buildings. Many tests and checks with consumers substantiate this statement.

We know the accumulation of dirt is not a straight-line function. Actually, it is a continually varying exponential function; so for the purpose of practical calculations, it is reasonable and sufficiently accurate to assume these follow a straight-line function as the average loss per month due to dirt is the important factor.

It has been proved repeatedly that when the consumer has to calculate the advantages of maintenance, he does nothing about it. The use of exponential functions, or the referring of the consumer to the use of such values, is enough to dampen any enthusiasm he developed at that stage. He can and often is willing to accept facts which can be easily determined from the operation of his own equipment.

Dust Depreciation . . . To determine the average dust depreciation rate, the fixtures and lamps in a representative area should be cleaned but not relamped, and the illumination measured with a lightmeter immediately before and after cleaning. By subtracting the "before" cleaning values from those obtained after cleaning, the gain due to cleaning is determined.

For instance, if the illumination level before cleaning was 30 ft-c, and after cleaning it was 50 ft-c, then you know the light loss due to dirt was 40%. By dividing this 40% value by the number of months the fixtures have operated since they were last cleaned, the average loss per month is determined.

Although the dust depreciation the first month may have been 4% and then decreasingly less per month as the dirt accumulates in layers, the important factor is that the average over the cleaning period can reasonably be termed the dust depreciation (or DD) rate per month.

Calculating DD . . . While DD is occuring and recurring, fluorescent lamp blackening, which is normal, continues, but at a decreasing rate of depreciation as the lamp becomes older. As it is impractical to expect maintenance managements to try to calulate DD at various stages of lamp life with its varying LPW (lumens per watt), it is much more reasonable to assume an average lamp LPW value which is taken at mid-life. If the lamps are to be group replaced, the average LPW should be taken midway between group replacement periods.

By using average DD rates from actual trials and average LPW depreciation rates from fluorescent and incandescent lamp LPW depreciation curves in Figs 1 and 2, the need for calculation and slide rule work by the maintenance man has been eliminated by the charts shown in this article. Mid-life LPW depreciation is 20% for fluorescent lamps and 10% for incandescent.

DD Rate . . . Percent dust depreciation or DD rate has been established as the ordinate for the charts of Figs 1, 2, 3 and 4. Fig 1 shows the percent average LPW depreciation which can be expected when fluorescent lamps and fixtures are cleaned at one to 12 month intervals and when the average DD rate ranges up to 12% per month. The vertical heavy line at 30% average LPW depreciation is drawn as a guide with the intention that cleaning periods selected will be to the left and not the right of that line so that decisions made for cleaning programs will not permit average depreciations greater than 30%.

For instance, assume an installation where lighting levels are to be maintained at 70% of initial or better and the light depreciation per month be-

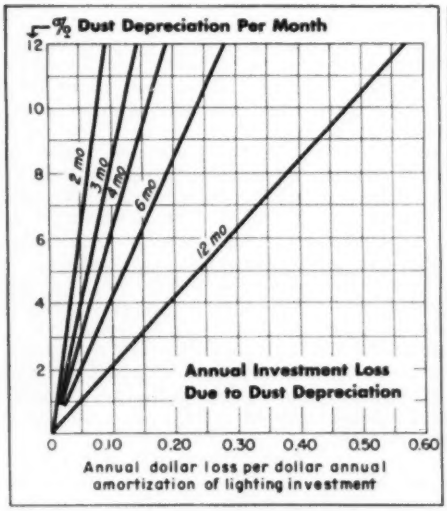


FIG 3—INVESTMENT LOSS per year because of dust depreciation for various cleaning periods of two to 12 months

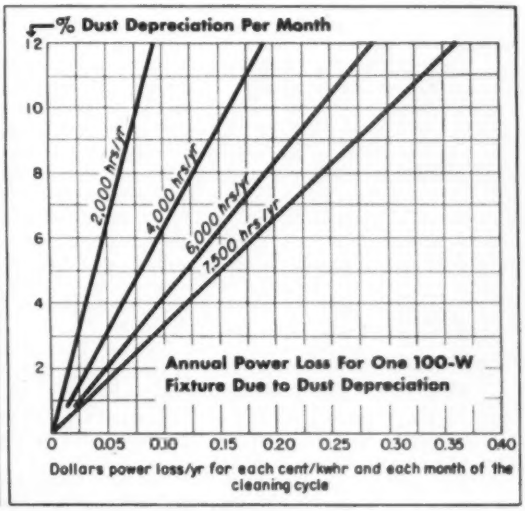


FIG 4—POWER LOSS per year because of the dust depreciation for the various burning hours and the various rates of DD

cause of dirt averages 4%. Then the cleaning cycle curve which crosses the horizontal 4% line to the left and nearest to the vertical "30% average LPW depreciation" line, is the proper cleaning cycle. In this case, it is the 6-month line; therefore, these fixtures should be cleaned twice each year. Likewise, if 40% depreciation were considered acceptable, a 12-month cleaning cycle would be satisfactory.

Investment Loss . . . Fig 3 shows the investment loss per year because of dust depreciation for various cleaning periods of 2 to 12 months. The values shown at the bottom of the chart are in terms of dollar annual amortization of lighting investment. In other words, when a person buys a lighting installation, he amortizes it in a certain number of years. We have assumed 10% per year as reasonable amortization and based our values accordingly to show how much is lost because of various maintenance methods.

Example . . . Suppose, we consider a lighting system that cost $10,000 to install which is amortized on the basis of $1,000 per year. Suppose this is an installation wherein the average monthly rate of dirt depreciation is 4% and the fixtures are cleaned every 6 months. Therefore, from Fig 3 the 4% DD line should be followed horizontally until it intersects the 6-month cleaning line. Below this intersecting point, we find the annual dollar loss per dollar of annual amortization is about 9.5¢. Therefore, the annual loss on the $1,000 amortization of the lighting installation investment is $1,000 x .095 = $95.00. This is a real loss of value, just as though the same person had bought a bond and the interest had decreased $95 annually from the $1,000 return expected. This is one of those important but hidden losses which can be saved by planned maintenance.

Burning Hours . . . Fig 4 shows the loss of value received for the money spent for electricity for various burning hours per year and various rates of DD. The use of the number of burning hours per year is a very important factor. Rarely in the past has any attempt to modify maintenance costs on the basis of burning hours been made. However, it is obvious from Fig 4 that if an installation is burned 6,000 hr per year, the depreciation is going to be much greater than if it is burned 1,000 or 2,000 hr per year. That is due to the fact that the LPW depreciation varies the total losses.

The values found from Figs 3 and 4 are actually the savings which result from a planned cleaning program. From these must be subtracted the cost of labor to clean the fixtures. Therefore, for a quick analysis of any installation cleaning cost or saving, add the values of Figs 3 and 4, then subtract from that sum the cost of labor. In this way it is possible to compare the relative saving between various cleaning periods considered.

This is a plan that can be readily co-ordinated with group replacement of lamps so that the individual cost of either is still further reduced. It would be better to say that savings are larger when planned cleaning and group lamp replacement are combined.

Our Fuels Won't Last Forever

The energy supply of the United States and the world, for that matter, is not a problem for the future, but for the present. Coal will not last the 1,000 years predicted in the past, but a mere 100 years. Meanwhile oil, gas, peat, lignite will have raced ahead into complete exhaustion.

This sounds calamitous. But the exposition of it in the new book "Energy Sources—Wealth of the World" (McGraw-Hill) is not the least bit dismal either in the picture it paints, or the way it is presented. For the authors, Eugene Ayres and Charles A. Scarlott have mastered the neat trick of presenting an essentially statistical report in a manner that is intriguing alike to the man on the street and the power generation specialist.

The statistics are thought provoking, particularly to engineers to whom today's profligate use of fuel has professional significance. We Americans have 60% of the World's coal and half of the oil shale and 1/3 of the oil reserves. Yet a decline in oil production may be on us in 1955-60. Authors Ayres and Scarlott report that six nations have already exhausted their oil, but that Russia and the Middle East may not reach their peak until 2,000 A.D.

Even with 1¼ million tons of oil shale in the USA, some deposits several hundred feet thick, recoverable oil will not make a teaspoonful in the barrel of demands. Processes for its recovery, plus deep-well extraction, strip mining, etc, take ½ trillion horsepower hours to produce an annual supply of 12 trillion.

Yet the spendthrifty pace of fuel use continues. Today 1/10 as much natural gas, BTU-wise, is used to make the carbon black for automobile tires as is combusted in the car cylinders. More wood is burned to bake bricks for a house than would be needed to build the house of wood to begin with. The job of hauling a million gallons of gasoline 2,000 miles by truck across the country uses half of the original load.

Atomic power? Yes, the authors say, but there is no present prospect that it will not be more expensive than what we now have. Hydro is twice as expensive in the aggregate in the USSR as in the USA. Solar heat may help but tides and winds will never constitute more than a negligible amount of energy. In this area the authors are particularly effective in dispelling the apathy and illusions and delusions about hydro, wind power, tidal power and atomic power.

Essentially a statistical book, the figures are here in conventional assembly. But the interpretation smacks not at all of the stodginess of the proverbial statistician. Taken to heart they can foster a renewed determination to husband the energy resources that are the key to our industrialized civilization. As the authors put it: "Man's resourcefulness continues on and becomes more potent with each passing decade. Because of this the future is bright".

Energy Sources—The Wealth of the World By Eugene Ayres and Charles A. Scarlott. Published by McGraw-Hill Book Co, New York, 36, N. Y. 344 pages, illustrated. Price $5.00.

HOW G-E EQUIPMENT SAVES YOU MORE ON SERIES STREET-LIGHTING SYSTEMS

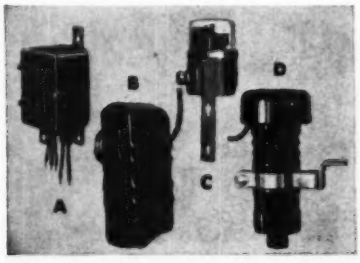
- ***Get optimum lamp performance***
- ***Save costly man hours in servicing . . .***

WITH G-E CONSTANT CURRENT TRANSFORMERS

You reduce operating expenses with G-E Constant Current Transformers because they give exceptionally fine control of secondary current from short circuit to full load . . . assuring maximum lamp life. They compensate instantly for even small changes in load or applied voltage, maintain low starting surge. They're easy to install, maintain their regulation with up to 5 degrees rake, and they're constructed for years of dependable, low-maintenance service.

Illustrated is the Type RO, normal power factor outdoor automatic current-regulating transformer; ratings 5 to 30 kw. Other G-E constant-current transformers: ROC, outdoor, high pf, 5 to 30 kw; RF, station-type, air-cooled, normal pf, 15 to 50 kw.

G-E TYPE RO TRANSFORMER



- ***Protect your circuits***
- ***Reduce operating costs . . .***

WITH G-E CONSTANT CURRENT CONTROL DEVICES

A Type J-1 Protector—provides protection from the hazards of open circuit conditions.

B Fuse Cutout—for primary fault and surge protection.

C Type P-1 Photoelectric Relay—low cost control automatically turns lighting circuits on at dusk, off at dawn.

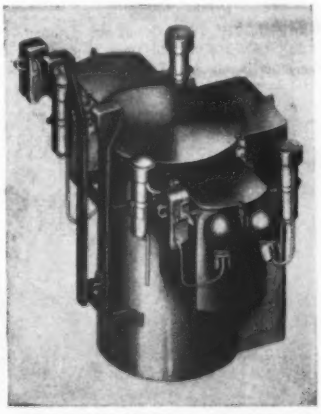
D Pellet Lightning Arrester—for protecting both primary and secondary side of transformers.

E Type E-1 Controller (not shown)—heavy-duty solenoid-operated oil switch to control transformers.

- ***Cut installation time and expense . . .***

WITH G-E "PACKAGED" REGULATORS

You reduce installation time and conserve pole space with G-E "packaged" Substation Type Constant-Current Regulators (illustrated at right). Available in 15, 20, 25, and 30 kw ratings, these "packages" contain all protective and controlling elements for efficient, economical series street-lighting operation where 120 V, 60 cycle control power is available. They are factory assembled and can be put into service simply by connecting power and control leads. Each component is readily accessible for servicing.



G-E SUBSTATION-TYPE REGULATOR

- ***Reduce planning, purchasing costs . . .***

WITH G.E.'s COMPLETE LINE OF EQUIPMENT

You can get all the equipment and devices you need for your series street-lighting systems from G.E.

Moreover, G-E lighting engineers will be glad to help you plan for your street-lighting needs. For information on any of the above equipment, or on G-E engineering service, write *Section 452-131, General Electric Co., Schenectady 5, N. Y.*

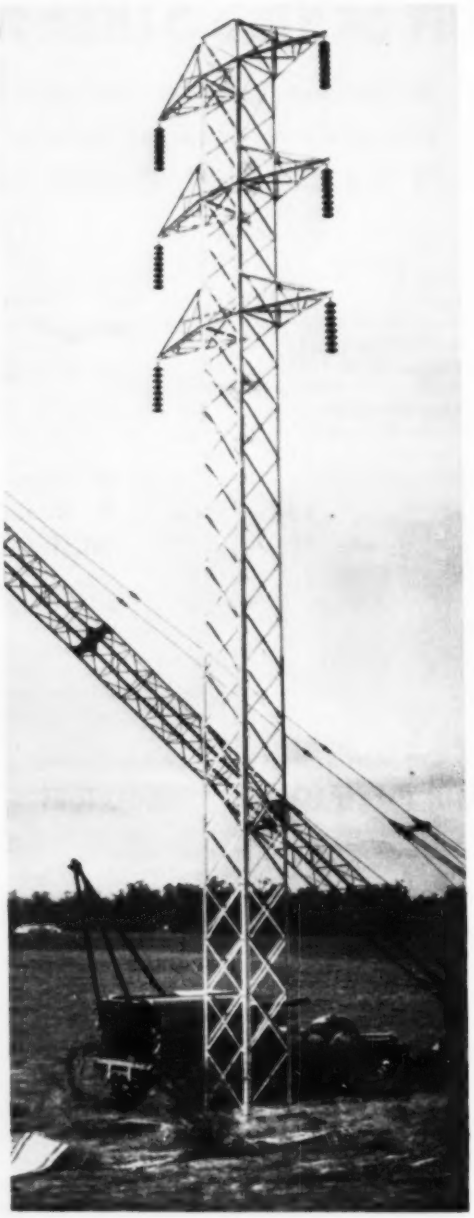
GENERAL ELECTRIC

Pre-Assembled Towers Cut Erection Time

PRE-ASSEMBLED STEEL TOWERS with a 4-ft square base were selected by California Electric Power Co because of the right-of-way problems that required keeping structure width to a minimum

RAISING THE TOWERS was accomplished by a 25-ton crane. Towers weighed 5,145 lb and were 78 ft hig'h. Up to nine towers were erected in one day by a crew of eight. One crane later successfully set in one piece a broad-base tower that weighed about five tons

SECURING THE TOWERS after they were erected by crane consisted merely of bolting tower legs to base. Using towers with such small base dimensions required a careful study regarding wind loadings and also regarding the span lengths for 4/0 copper conductors used



COMPLETED TOWER is designed for operation at 115 kv to carry power from new Highgrove Station. Initial operation will be at 92 kv. Copper conductors with 600-ft span lengths were found to be about 18% cheaper than equivalent ACSR conductor with 440-ft spans

THE BEST PROTECTION FOR YOUR DISTRIBUTION SYSTEM

35 million arrester-years *haven't* been wrong! G-E Pellet Arresters hold lightning voltages to lower levels—more consistently over the years—than any other distribution arrester.

Year after year, General Electric Pellet Arresters have continued to provide a combination of low sparkover and low IR drop that holds lightning voltages on the transformer to safer values—safer than with any other distribution arrester.

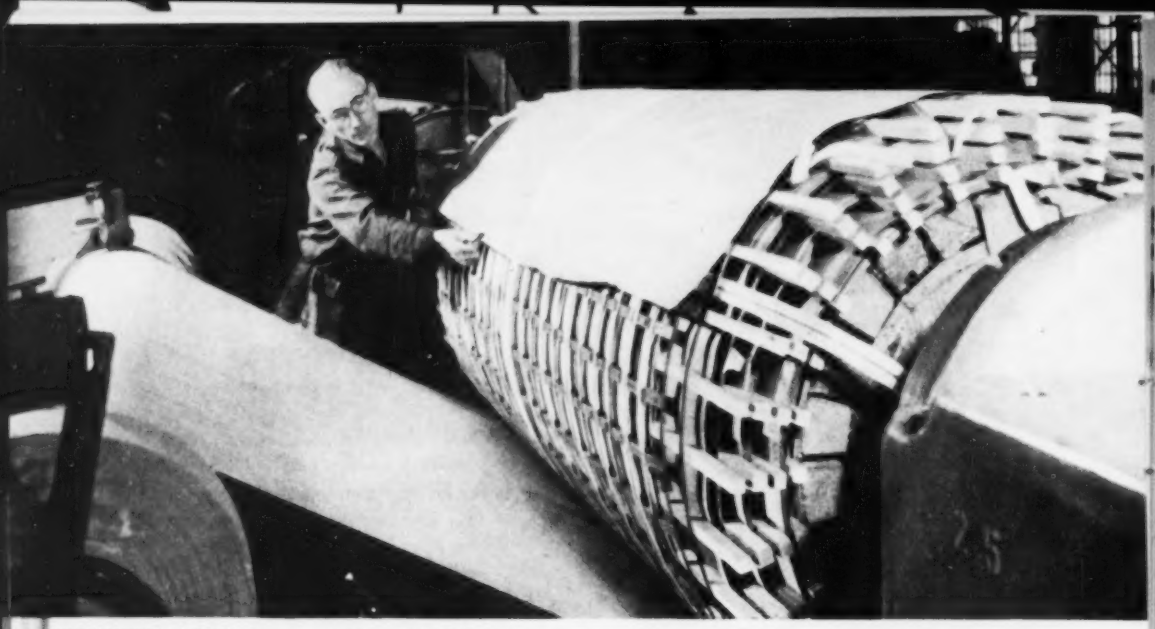
What's more, these unexcelled protective characteristics remain practically unchanged with time. Dry inert nitrogen (N_2) fills the sealed gap-chamber and prevents the formation of ozones and oxides. Gap electrodes stay bright as new, and low sparkover characteristics are stabilized. Sealed-in-nitrogen construction is *exclusive* with G-E Pellet Arresters.

The pellets, of lead dioxide, are actually formed with water in a tumbling barrel. Providing valve action with exceptionally low IR drop, they are unaffected by atmospheric moisture, condensation or humidity.

These features mean the best in protection—achieved through 35 million arrester-years of operational experience. This pellet arrester service record is unapproached by any other distribution arrester.

Don't gamble when you buy protection—insist on G-E Pellet Arresters for your distribution system. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

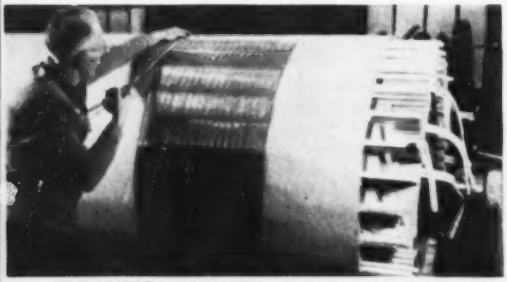
GENERAL ELECTRIC



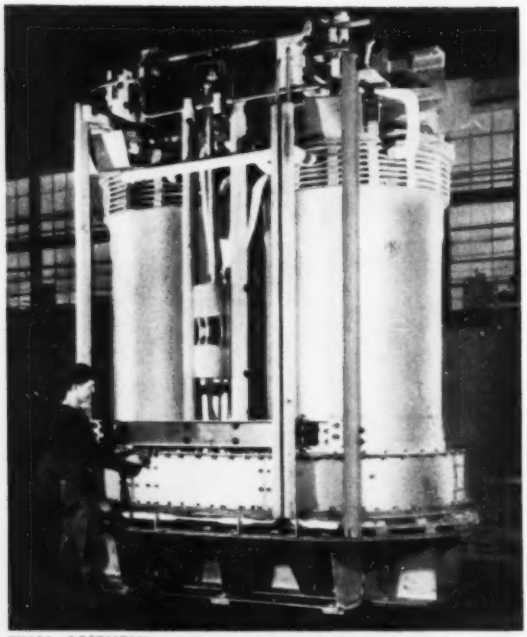
"CONCENTRIC LAYER" winding for 42,500-kva, 230-kv/132.8-kv GrY transformer. Workman is starting a layer of Kraft paper insulation. Other layers of insulation can be seen at the near end – separated by temporary wooden spacers. Later, these wooden spacers will be removed and the insulation will be flanged over the ends of the windings.

Here's "CONCENTRIC LAYER"..

FIRST LAYER of conductor is wound on laminated paper cylinder. Friction ring holds coil tight during winding. Each layer is clamped tightly while succeeding layers are wound.



LINE SHIELD applied outside last conducting layer completes shielding of coil. Final "cylinder" of insulation will cover this shield to complete the winding.



FINAL ASSEMBLY of core and coils for a 42,500-kva General Electric single-phase "concentric layer" power transformer is completed.

The power transformer winding that meets all the requirements for very high voltage

"Concentric Layer" windings provide important advantages on all G-E transformers 750-kv BIL and above

● **Uniform distribution of impulse voltages** and the elimination of harmful oscillations are characteristic of "concentric layer" construction. As a result, voltage stresses can be calculated accurately and insulation applied precisely as required.

● **Lower weights and dimensions.** Voltage stresses between the low- and high-voltage windings are reduced to a fraction of those occurring with other types of construction. Space factor is improved, and the reduction in weights and dimensions permits a larger kva unit to be built in a one-piece tank.

● **Effective inter-layer cooling.** Vertical ducts between layers permit unrestricted oil flow past each conductor.

● **Greater mechanical strength.** Major magnetic stresses in the "concentric layer" winding appear as *tensile* forces. These are inherently easier to withstand than the *bending* forces which occur in non-concentric designs. A full size "concentric layer" transformer successfully passed short-circuit tests at *rated* voltage, demonstrating the great mechanical strength of these windings.

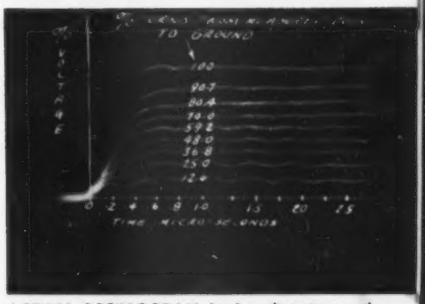
G-E "concentric layer" transformers now being built at a rate of 2,500,000 kva per year!

Calculations and tests show that from every angle the "concentric layer" winding is superior. Since 1940, all new G-E transformer designs, 750 kv BIL and above, have included this winding. Today, with the rising trend to higher system voltages, shipments of G-E "concentric layer" transformers are exceeding 2,500,000 kva per year!

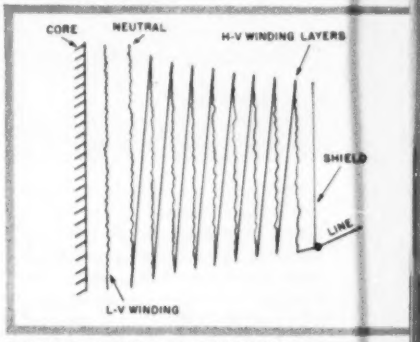
If you are contemplating voltages of 161-kv and above, you may wish to review the data on these windings. Ask for GER-129. Address inquiries to your nearest G-E Apparatus Sales Office, or write directly to Section 401-28, General Electric Company, Schenectady 5, N. Y.

"Concentric layer" windings consist of a number of cylindrical layers arranged concentrically, as shown on these pages. The innermost layer, adjacent to the low-voltage winding, is connected to the neutral. Then, successive layers are connected in series progressively, with the outer layer being connected to the line.

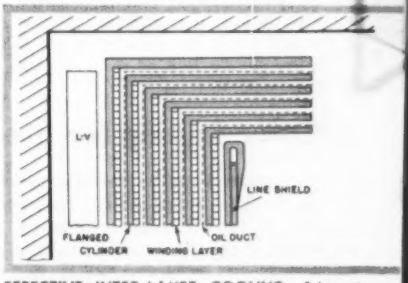
Basic insulation is provided by cylinders of insulating material. These cylinders are flanged over the ends of the winding to eliminate creepage paths in the direction of high electrical stress. The entire winding is protected from transient voltage stresses by electrostatic shielding.



ACTUAL OSCILLOGRAM showing voltage to ground at equally spaced points in the winding when 0.6 x 190 microsecond impulse wave was applied to line end. Absence of large oscillation is indicative of uniform impulse distribution.

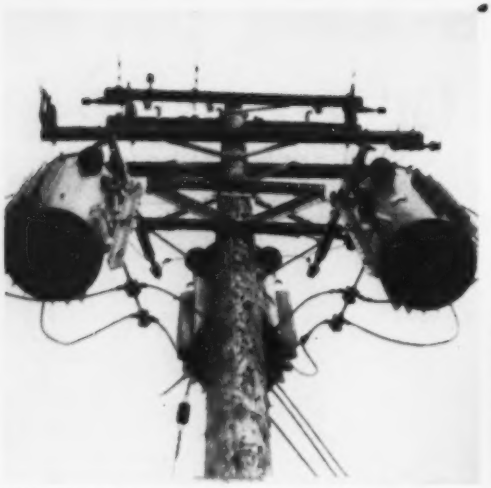


WINDING CONNECTION DIAGRAM shows that voltages between layers and between high- and low-voltage windings are only the voltage of one layer since successive layers are connected in series progressively.

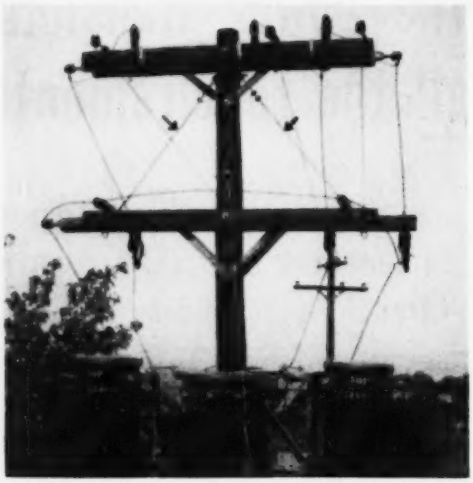


EFFECTIVE INTER-LAYER COOLING. Schematic diagram of "concentric layer" winding showing six layers insulated by flanged cylinders. Dotted lines show path of oil past each turn of the winding.

GENERAL ELECTRIC



STANDARDIZED MOUNTING provides for the cluster arrangement of three, single-phase, 50-kva units with EEI-NEMA mounting lugs



WIRE ROPE SUPPORT attached to pole and crossarm (arrows) speeds raising transformers. Note support loops just below double crossarm

X-braced Truss Speeds Transformer Bank Installation

R. W. WESTPHAL, Engineer, and
M. E. VAN AUKEN, Engineer, Consumers Power Co, Jackson, Michigan

From a few standardized structural steel parts, Consumers Power Co engineers have developed an improved mounting for two or three single-phase transformers on a pole. The complete mounting requires only eight standard parts. It will handle transformers of 100 kva and smaller with voltage ratings of about 15 kv and less.

Parts used are known as the Erection design. They form an X-braced truss which is assembled on the ground or in the stock room. It is bolted to the face of the pole and backed up on the opposite side by plate and angle parts. Transformers with EEI-NEMA standard mounting lugs are bolted directly to the vertical angles of the truss and the pole. This mounting eliminates the costly crossarm T-hanger and adaptors. At the same time, it provides mountings for almost any older type of transformer with welded hangers.

Another feature is wire rope loops for supporting hoisting equipment which makes raising and lowering of transformers safer and easier. Transformers can be raised directly to the mounting positions, because these loops, which are supported by wire rope attached to the pole, are installed on the double crossarm directly above these positions. This eliminates use of special gins and reduces manhours required for mounting.

Optimum working space has been provided for the lineman who will have maximum clearance from energized conductors and equipment. With more than 6 ft of unobstructed space between the primary terminals of opposite transformers, accident hazards have been reduced.

Because flexibility is a basic feature of standard erection design parts, mountings for larger or smaller transformer sizes can be developed easily by adding or removing a few of the eight standard parts. These parts consist of 2½ x 2½-in. angles of different lengths and ¼ x 6 x 12-in. plate.

Color Styling for Steam Power Plants

E. J. HIGGINS, Mechanical Engineering Div, American Gas & Electric Service Corp, New York, N. Y.

Aluminum paint has been used during the past two years by American Gas and Electric system for finishing structural steel, boilers, coal bunkers, piping, tanks metal deck ceiling, etc, in the turbine-room basement, boiler room, heater-bay, and bunker-bay areas. Formerly buff and cream paints were used for these areas.

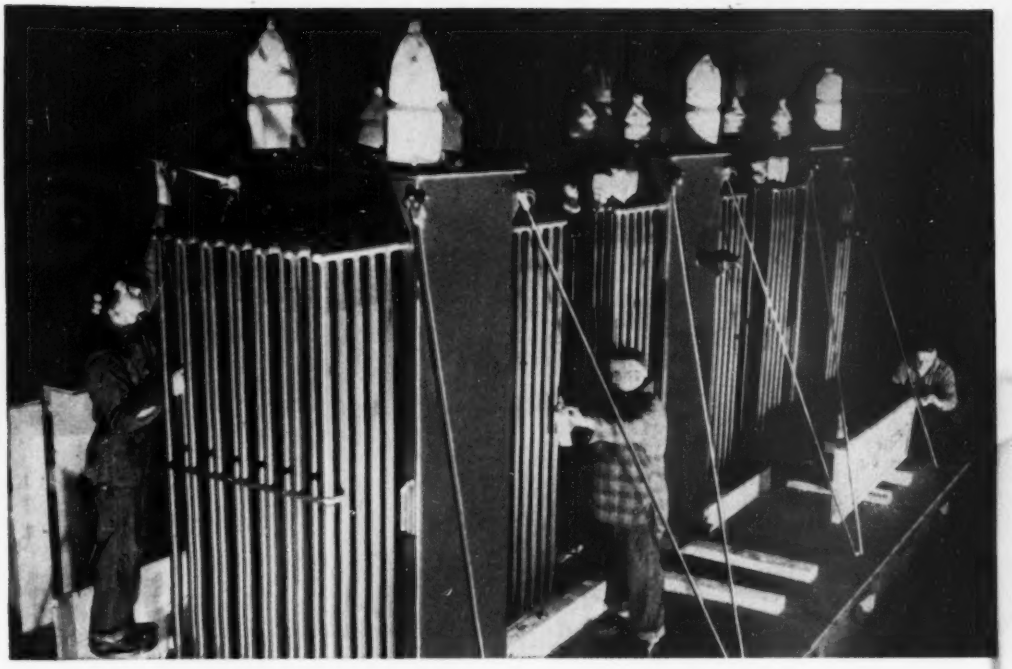
By employing a metallic paint with its high hiding power, one undercoat is eliminated resulting in substantial savings in labor and materials. Motors, pumps and other auxiliaries in these areas are finish coated with "Equipment Green" which has a bluish-green hue.

In the turbine room, the best possible techniques of color-styling are employed. The turbo-generators are finished with three values of green: Mop-stripe (dark green); base (medium green); body (light green).

Red asphalt tile, a complementary color, is used on the floors. Structural steel columns up to and including the crane rails are finished with the medium-value green. This green is also used on the bases of the turbo-generators. The ceiling is finished with a very light green tint.

(*Continued on page* 146)

Excerpt from paper presented before Engineering and Operation Section's Conference of the Southeastern Electric Exchange, St. Petersburg, Florida



89 Different Electric Utilities Specified RM* Transformers in 1951...gain of 15.6% over 1950

RM designs now conform to new ASA Standards... faster shipments, lower prices are retained

Our records for 1951 show that 89 different electric utilities capitalized on the shorter shipments at lower prices obtained by specifying General Electric's RM power transformers. This represents an increase of 15.6% over the 77 utilities that placed RM orders in 1950.

In terms of actual volume, RM units accounted for 59.2% of all orders for power transformers in the RM range—convincing evidence of their wide acceptance, and of the flexibility in application they offer.

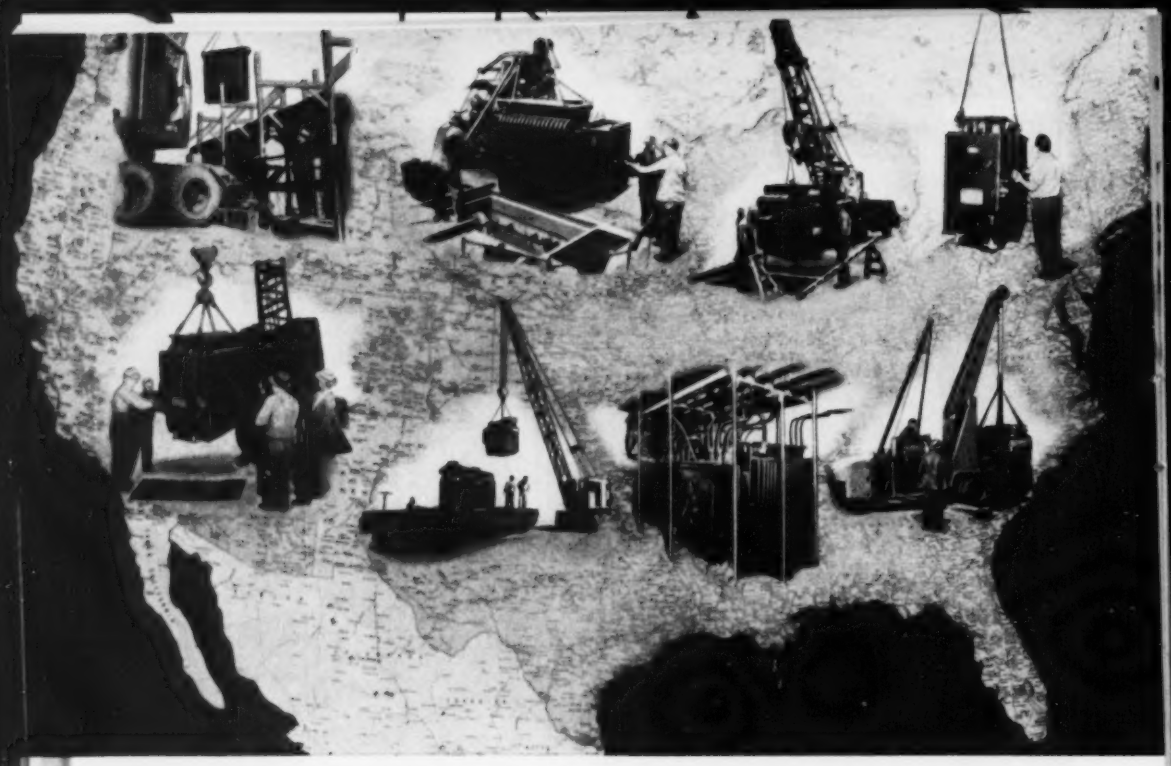
This year we anticipate even wider acceptance of RM transformers which now conform to the new Proposed Standards for Transformers, recently adopted by the users and manufacturers represented on the ASA C-57 Committee. These new RM ASA transformers offer the same price and delivery advantages as previous RM designs.

For complete information on the new ASA Standards, and on RM ASA transformers, see your local G-E representative. Or write to *General Electric Company, Schenectady 5, New York.*

*RM stands for "Repetitive Manufacture." By using standardized construction methods, General Electric builds RM power transformers more economically — delivers them faster. RM designs are available in ratings 10,000 kva and below and up to 69 kv, with many optional features.

401-29

GENERAL ELECTRIC



Secondary networks key to easy expansion in city after city across the nation

G-E network units added by many utilities . . . often as only step in increasing system capacity

Even today's rapidly expanding urban loads cause little difficulty in cities where secondary network systems have been installed.

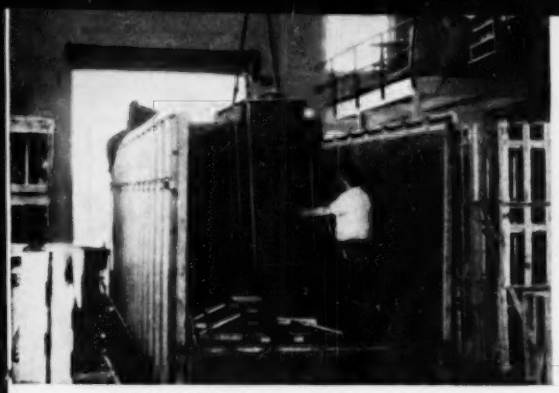
Unlike radial distribution systems, secondary networks permit electric utilities to handle increased loads—foreseen and unforeseen—without resorting to extensive engineering calculations, rearrangement or bolstering of circuits, or juggling of existing loads. And this, in addition to maintaining virtually uninterrupted service and uniformly firm voltage!

The installations pictured on the right clearly demonstrate the ease of meeting load growth once you have gone to a secondary network. In practically every case, all that was necessary to take care of increased loads was additional network units. Where required, utility crewmen constructed transformer vaults; installed new G-E network transformers; and tapped them in to reinforce existing secondary grids!

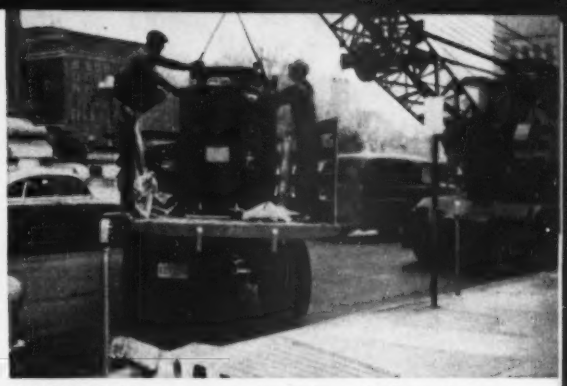
If you're struggling to accommodate new loads by perpetuating a radial system and your load density has risen to approximately 10,000 to 15,000 kva per square mile, it may be time for you to investigate the flexibility and economy of a secondary network.

When you do, be sure to consider the extra advantages of G-E standardized network equipment. Quantity production methods reduce manufacturing and assembly time. You get faster delivery at lower prices. And refinement in design—made possible by quantity production—means lower installation and maintenance costs.

For help in solving your network problems and for complete information on G-E network transformers, see your local G-E representative. Or write for Bulletins GEA-5024 and GEA-2017. *General Electric Company, Schenectady 5, New York.*



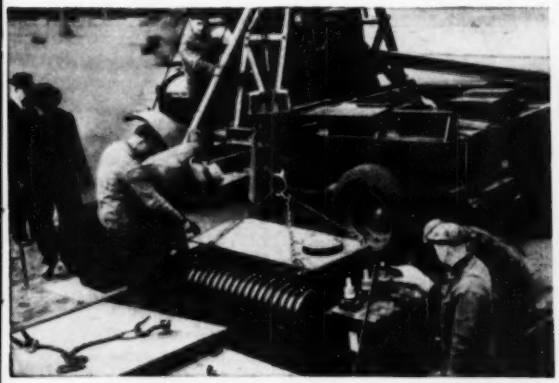
PROVIDENCE Narragansett Electric Company prepares to add another G-E network unit. An overhead crane eases unit into truck for transportation to vault site.



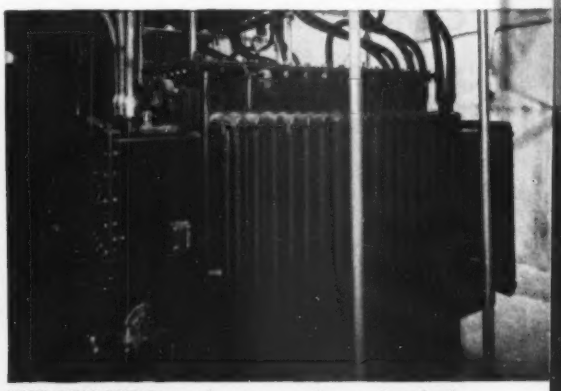
INDIANAPOLIS Crewmen of the Indianapolis Power & Light Company rig a new G-E network transformer to be transferred to sidewalk vault on North Pennsylvania Street.

SACRAMENTO And still another General Electric network transformer being added. Workmen are guiding suspended unit towards vault opening.

SAN FRANCISCO adds capacity in heart of "down town" district. G-E standardized network unit enabled Pacific Gas & Electric to construct vault of minimum size at Pine St.



ST. LOUIS and the location is Clark Avenue and 15th Street. Union Electric's crew will soon have this standard G-E network unit in place and connected to secondary grid.

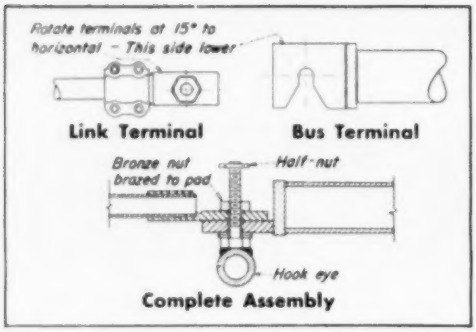


NEW ORLEANS Scene taken in an underground vault of the New Orleans Public Service system shows G-E network units connected up and ready to handle their share of load.

GENERAL ELECTRIC

402-119

DISCONNECTIBLE BUS LINKS developed by Bonneville Power Administration permit easy isolating of transformers for servicing



EASY OPERATION is assured by terminal design using a captive eye bolt in the movable link which slides into wide slot in stationary link

Isolate Primaries With Simple Inexpensive Link

J. A. GERBER, Project Engineer, Substation Design Section Bonneville Power Administration

To isolate the high voltage side of small three-phase transformers from the 115-kv bus, Bonneville Power Administration has developed an inexpensive, readily disconnectible bus link. It is used where circuits need be opened only infrequently, and where a disconnect switch is not economically justified. By its use, a transformer can be isolated for servicing with a station outage of only a few minutes.

The disconnecting link is made up of a length of ¾-in. IPS copper bus tubing. At one end is a flexible hinge made of spring brass leaves, which mounts on the transformer bushing. The spring prevents the link tubing from striking the bushing or tank when released. At the other end is a clamp-type tube terminal with a captive eyebolt. The shank of the eyebolt slips into a slotted tongue of another tube terminal installed on the stationary bus. Adequate electrical contact is obtained when the flat surfaces of the two tube terminals are clamped together by tightening the eyebolt with a switch hook stick.

Typical installation is in a 115/12.5-kv substation where the high voltage sides of two 6,000-kva three-phase transformers are connected through these links to a short bus feeding through a single set of fuses. Ahead of these fuses is a group-operated disconnect switch which is used for interrupting the transformer magnetizing current. The low-voltage sides of the transformers are connected through conventional 15-kv disconnect switches to a short bus, then to one feeder circuit breaker with standard isolating and bypass disconnect switches.

Crane and Tractor Carry Poles Over Winding Roads

WINDING NARROW ROADS require that truck-mounted crane and truck-tractor with a special swiveling mount be used to carry 75 and 85-ft poles to construction site

MILTON M. ZELLERS, Truck and Equipment Dispatcher, Los Angeles Dept of Water and Power

To transport 75 and 85-ft poles along narrow roads with sharp turns, Los Angeles Dept of Water and Power uses a truck-mounted crane to support one end and a special swiveling mount on a truck-tractor to carry the other end. Transit time with this arrangement has been about ½ mph on two different runs.

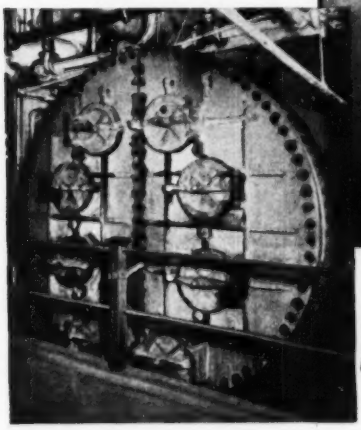
Need for a means to transport extra long poles on mountain roads arose in connection with construction of guard structures to protect existing transmission lines while another line was being strung. One crossing required six 75-ft poles; a second, three 85-ft poles.

These poles were hauled to the bz-

(*Continued on page* 152)

Before you SCRAP!

Condenser of the Lynn Gas & Electric Co., Lynn, Mass., which was returned to service by use of inlet-end inserts at a saving of $30,000.



Before you scrap condenser tubes because of inlet-end leaks

GET ALL THE FACTS

It sometimes happens that a combination of erosion and corrosion at the inlet ends of condenser tubes may seem to force their replacement. This is not always necessary. If the damage is confined to a small area at the inlets, and the tubes otherwise are in good condition, they can be saved by using inserts designed especially for just such circumstances. There are several makes available, none made by Revere.

In a recent case, involving a condenser of the Lynn Gas & Electric Company, Revere recommended inserts. Here are the figures: Number of tubes involved, 4,100; Replacement cost, $35,000; Cost of inserts to cure the trouble, $5,000; Saving, $30,000. Repairs should enable the condenser to serve for several more years. The work was so successful that a similar job was done on another Lynn condenser containing 2,700 tubes.

Of course Revere wants to sell condenser tubes, and its other products in copper and copper-base alloys, and aluminum, but we know that fast friends and loyal customers are won by taking to heart the best interests of those with whom we deal. May we have the privilege of working with you on condenser tube matters? Send for free booklet, "Life Extension for Condenser Tubes."

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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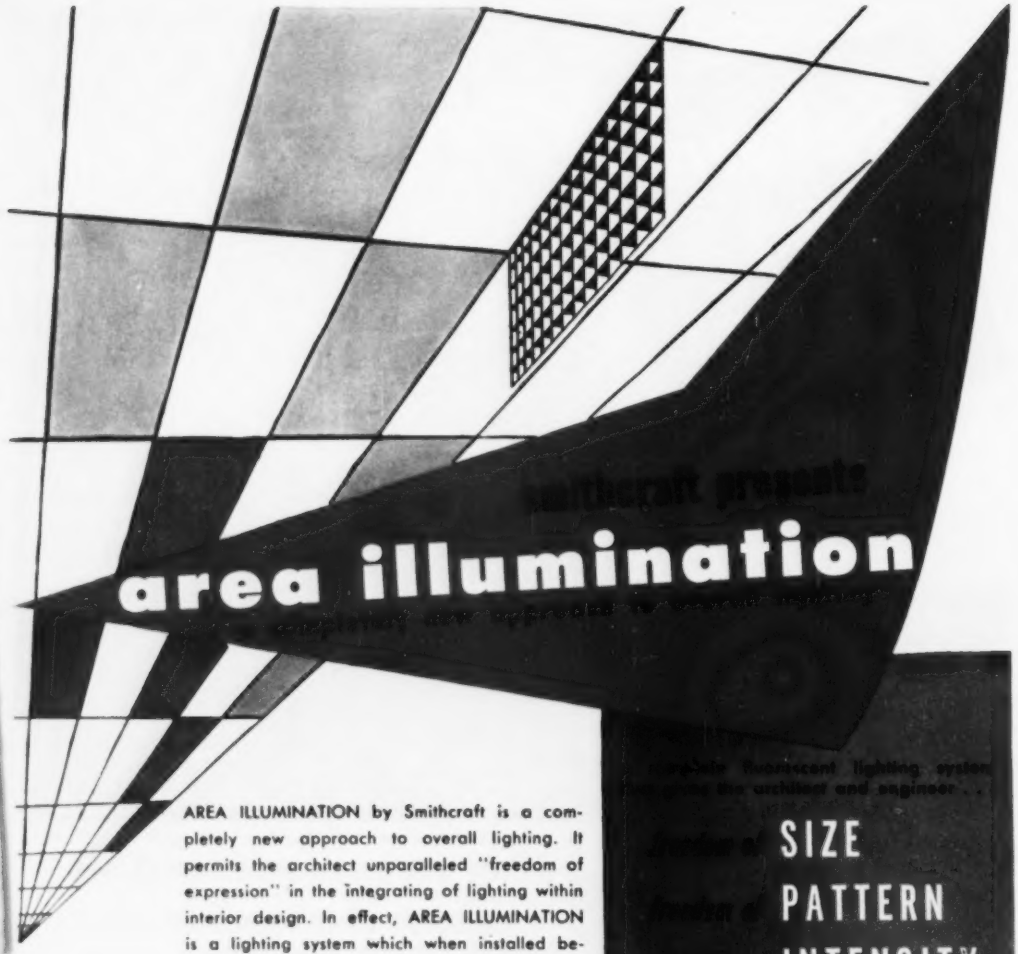
• • •

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities. Distributors Everywhere

SEE REVERE'S "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY



area illumination

AREA ILLUMINATION by Smithcraft is a completely new approach to overall lighting. It permits the architect unparalleled "freedom of expression" in the integrating of lighting within interior design. In effect, **AREA ILLUMINATION** is a lighting system which when installed becomes a lighting "fixture" of limitless dimensions and patterns, with an endless choice of shielding media. Here is a "fixture" which is not "custom-built" to each installation, yet permits selection of varied lighting intensities with any method of shielding. Its cost is comparable to that of a suspended ceiling and troffer system . . . its simplicity of installation and ease of maintenance are entirely new developments in overall lighting.

SIZE
PATTERN
INTENSITY
SHIELDING
PERIPHERY

. . . and more . . .

it's ECONOMICAL, EFFICIENT
and extremely EASY TO INSTALL!

Smithcraft *America's finest fluorescent fixtures*

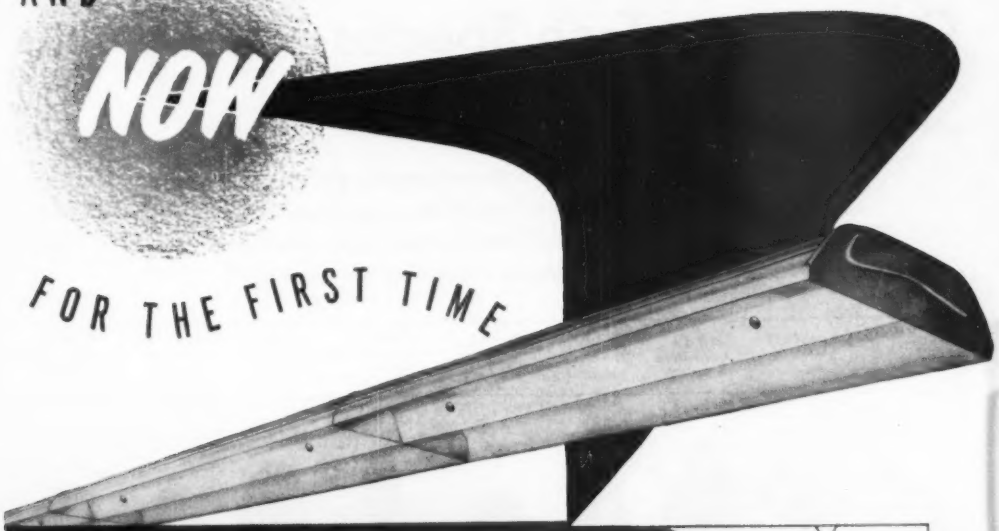
LIGHTING DIVISION

See it at the 9th International Lighting Exposition in Cleveland (May 6-9).

AND

NOW

FOR THE FIRST TIME



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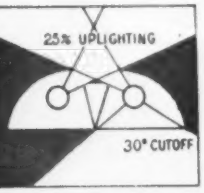
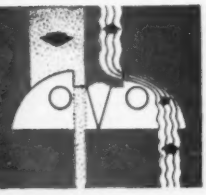
THE A·L·S SLIMLINE

25% UPLIGHTING



STAYS CLEAN LONGER



NO DARK AREAS

America's finest fluorescent fixtures

Smithcraft

LIGHTING DIVISION

CHELSEA 50 MASSACHUSETTS

...the 4th International Lighting Exposition in Cleveland (May 6-9).

ENGINEERING REFERENCE SHEET

No. 52-8

Ornamental Tree Species:

MORE COMPATIBLE WITH OVERHEAD LINES

GEORGE B. BLAIR, Forestry Consulting Service, Jackson, Michigan

Accompanying tree list is nation wide and covers eight species that should be encouraged where planting is to be done on street and highway rights-of-way. Certain trees manifestly have characteristics that are advantageous to power companies. Trimming suggestions are included

Species[1]	Norway Maple *Acer platanoides*	Red Maple *Acer rubrum (in variety)*	Pin Oak *Quercus palustris*	Globe Locust *Robinina P. umbrac*	Maidenhair *Ginkgo biloba (Male Preferred)*	Flowering Gum *Eucalyptus ficifolia*	American Hornbeam *Carpinus caroliniana*	Goldenrain *Koelreuteria paniculata*
General Outline								
Form Type[1] (shape)	Low spreading	Narrow rounded	Pyramidal	Globe	Narrow rounded	Spreading	Bushy	Spreading
Mature Height[1], ft	40-45	45	50	20-25	40-50	40	15-20	35-40
Annual Vertical Growth Rate[4], ft	0.75	1	0.80	1	1 or less	Variable	0.60	1
Wood Strength, mod. rupture sq. in., lb	9,000 approx.	7,700	8,500 approx.	13,800 approx.	Not available; - Weak	Not available; Fairly strong	6,700	Not available; Medium strong
Spacing, ft	50-60	40-50	40	50	35	45	30	50
Distinctive Features	Sturdy; large leaves	Fall foliage	Fall foliage; acorns; symmetry	Lacy foliage; showy bloom	Fan shaped leaves	Bloom	Rugged appearance	Yellow bloom
Soil Requirements	Medium rich; well drained	Does best on moist rich	Acid; medium rich	Any upland type	Any well drained	Any well drained	Dry, gravelly	Nearly any type
Suitable Location	Wide parkway, roadside, lawn	Park, street, roadside	Street, lawn, park	Narrow street	Lawn, street, park	Park, lawn	Street, roadside	Street, lawn, park
Distribution	Missouri R. Eastward	S.E., S.W. and North	Miss. R. Basin east and west	Midwest and Pacific Coast	Most of U.S. except N. States, Mts.	Calif. and Gulf States	Ontario, No. States — S.W.	General, except high altitude
Vulnerability	Rugged. Occasionally host for leaf aphis	Weak wood. Leaf galls	Structurally strong. Chlorotic yellowing of leaves	Strong wood. Susceptible to borers	Weak wood. Disease resistant	Will not stand low temperatiire	Small for street planting	Tolerant of severe atmospheric conditions
Detrimental Characteristics	Shade too heavy for good lawns	Reasonably good habits	Acorns a lawn nuisance	Seed pods	Foul-smelling seed covers on female trees	Wood not too strong	Good habits	Chiefly good habits
Reproduction	Heavy seed producer	Seed Stump sprouts	Seed	Seed. Sprouts	Seed	Seed	Seed. Sprouts	Seed
Trimming Suggestions for O.H. Lines[5]	Top and side, trim lightly	Top and side, trim lightly	Side trim, moderately	Avoid thru and side trim	Top and side trim	Top trim	Top trim, if needed	Top trim, moderately

Note: Similar data for trees most commonly found along overhead lines were published in another Engineering Reference Sheet No. 52-7 (EW, April 7, 1952)

Notes:
1. No conifers are tabulated herein as such species are not frequently used in street planting.
2. General form a tree crown assumes when ample space is available for natural development.
3. A specie characteristic, deviating soil fertility also with climatic conditions of temperature and rainfall.
4. Rate of growth varies with soil fertility, and moisture supply. Induced growth caused by excessive trimming is greater.
5. Open wire construction; cable types require less tree clearance.

NO. 1
IN A SERIES

AN EXECUTIVE WITH A WELL KNOWN UTILITY ASKS—

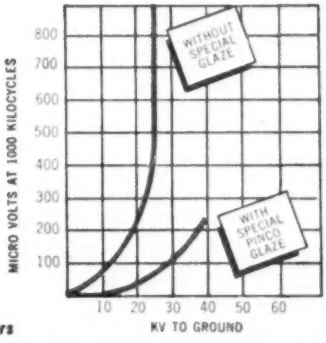
"Just How Much Radio Interference Caused by Insulators does a PINCO 'NOCORONA' UNIT Eliminate?"

The best way to answer this question is to say that at radio frequencies, Pinco "Nocorona" Insulators are *silent*. In other words, radio interference is reduced to a minimum!

In the 1920's, as the popularity of radio increased, set owners demanded that something be done about power line "interference." In 1929, Pinco introduced its "Nocorona" units which proved to be an effective means of eliminating radio interference. Today, thousands of these Pinco "radio-proofed" insulators are in service on distribution and transmission lines from coast to coast. Television viewers too, are benefiting by the application of this Pinco principle in previously affected areas.

Pinco "Nocorona" units combine all of the outstanding features of Pinco standard Insulators, *plus* the application of a special glaze at the critical points—the conductor groove, tie wire grooves and the pinhole. This glaze, being conducting, creates a bond between the conductor and the insulator, thus eliminating the possibility of brush discharge from the conductor to the insulator.

The accompanying chart shows the performance curves of the Pinco L-75 (plain) and the L-75R (Nocorona) 45 K.V., one-piece Insulators . . . positive proof that Pinco "Nocorona" Insulators definitely eliminate radio interference!



For Complete Information regarding Pinco Pin-Type Insulators refer to page 28 of Pinco Catalog No. 49 or contact the Joslyn office in your locality.

PINCO INSULATORS

The Porcelain Insulator Corporation
761 Main St., Lima, N. Y.

Sales Agents: JOSLYN MFG. & SUPPLY CO. *Offices in Principal Cities*

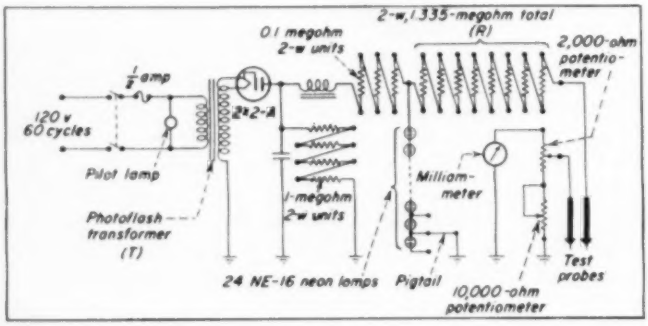
Pole Tractor

(Continued from page 146)

ginning of the narrow winding section by a truck with a special swiveling bolster and a regular pole dolly. Here the dolly end of the poles was transferred to the hook block of a 20-ton truck-mounted crane with a 35-ft boom.

With the truck in the lead, the crane boom successfully maneuvered the poles around the sharp turns of the mountain road. One 3½-mile trip required 9½ hours, including loading and unloading poles. Another 3-mile trip required 5 hours to be completed by truck.

Upon arrival the poles were set by the truck-mounted crane in previously dug holes. Poles were removed and returned to the pole yard by the same method used in transporting poles to the job.



LOCATING FAULTS in demand meters is safe, simple and convenient with home-made insulation tester operating on ohmmeter principle and using high voltage. Schematic diagram shows components which comprise the tester. Cost of all of the parts purchased was only $42

Insulation Tester Locates Faults Safely

W. H. BLAIR
Meter Laboratory
Potomac Electric Power Co
Washington, D. C.

To check insulation in demand meters, demand registers, rotating standards, phantom loading devices and other instruments, a handy insulation tester was made from radio parts costing only $42.00. It is safe, simple, compact, and convenient to operate.

Test probes are merely touched to circuits being checked and results read directly from the indicator. It has been used successfully around our shops and laboratories for the past two years. It has been very effective in locating faults thru probing and the process of elimination. Test voltage is dc and approximates peak value of a 1000-v sine wave. Because test current is limited to 1.086 ma, test probes may be handled with safety by operator. Test current flowing into a fault is non-destructive.

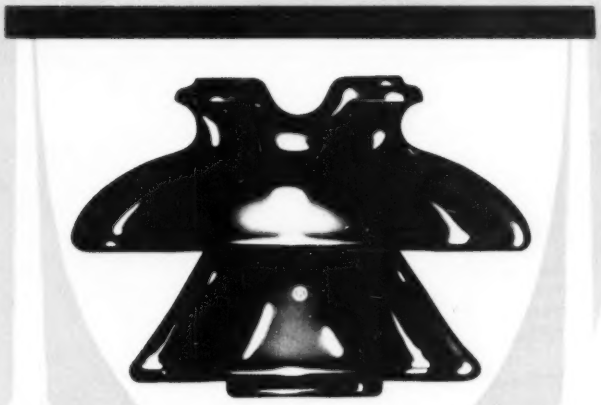
Circuit of tester is essentially that of an ohmmeter. Major difference is that high voltage (1460-v) is used instead of the usual 1½ or 15-v battery. Instrument weighs 14½ lb and is built on an 8 x 10-in. chassis. Ends of carrying handle extend beyond their mountings to serve as a cleat for securing test leads and power cord when not in use.

The 24 neon lamps are used to stabilize the dc test voltage (1460-v) against line voltage fluctuations. Indicator is a milliammeter rated 1 milliamp full scale and calibrated in megohms. Center-scale value is approximately equal to 1.5 megohms. The 20 megohm division is about ¼ in. from the infinity mark. As a safety measure, the current-limiting resistance, R, consists of eight 2-w carbon units in series to provide a safe voltage gradient along this component. High-voltage transformer, T, is of the type employed in high-speed photo-

(Continued on page 157)

Hydraulic Lift Aids Tree Crews

Hydraulic lift with a 5-ft swing arm has appreciably reduced the manual labor of tree trimming crews of Consumers Power Co. The lift is used for loading heavy sections of trees on the truck. It will handle up to 1,000 lb and handles 600-800-lb logs with ease.



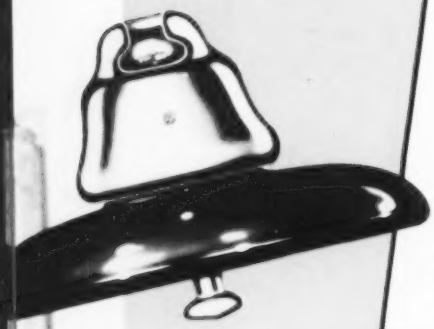
Long enough to mean something!

Nearly 40 years ago this line was built with O-B pintype insulators and in all that time has served an important industrial load center with practical freedom from insulation trouble. This many years have established a few basic facts -- the downright reliability of pintype design -- the durability of O-B's interpretation of this design -- the wisdom of specifying O-B pintypes when such performance is expected.

Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*

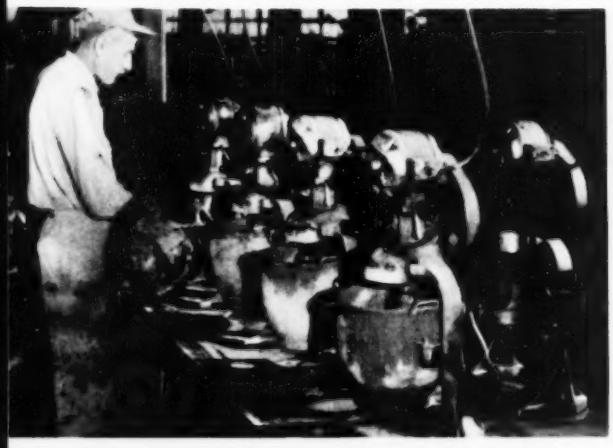


As well as we know how!

To assemble an O-B suspension insulator, pure Portland cement is mixed with water of just the right temperature, for a specified time, in small "kitchen size" batches . . . What we want is perfect control of the mixture and assurance of its being used before taking its quick primary set, after which agitation results in some weakness . . . Small quantities are convenient to weigh accurately, mix thoroughly, and are used up in a few minutes. There are quicker ways and cheaper ways to do this job, but we've never seen a better way . . . Not only this simple little process but, more important, this general attitude accounts for the life and behavior of O-B suspension insulators. They can be trusted because they're made as well as we know how.

Works Almost as Easily Hot as Cold

Short, temporary "hot-tie" wires take time and trouble to install -- the energized end is dangerous -- the finished job weak and unreliable -- and you don't have to take this penalty merely to work a line hot. O-B Clamptops, available on either pintypes or posts, substitute a simple jaw and two hex nuts for the old-time tie wire. Slipless holding power equals the maximum permissible mechanical load on the pole in most cases. The grip never deteriorates. And a simple hot line tool handles the job quickly and safely . . . Even though you don't contemplate hot working of your lines, you are *sure* of wind or ice that loosens tie connections, causing abraided conductors and possible breaks. Any way you look at it, the modern O-B Clamptop is a better way to connect a conductor to an insulator. Try it and see for yourself.



GET YOUR HARDWARE FOR NOTHING... AND THEN SOME!

On a transmission line of average loading, O-B Cooline non-magnetic hardware will repay its total cost five to seven times within the next 25 years. At a 300-ampere phase current, the average ferro-magnetic clamp will consume 20 to 30 watts in heating. There are at least three to a tower. Apply your own figures to this loss. What does it cost in otherwise salable power and in wasted generating investment? . . . Cooline hardware conserves this power and brings a little more of your coal pile to the meter. The dollars involved probably won't make or break your company, but it's a handy way to get your line hardware for nothing -- and then some!

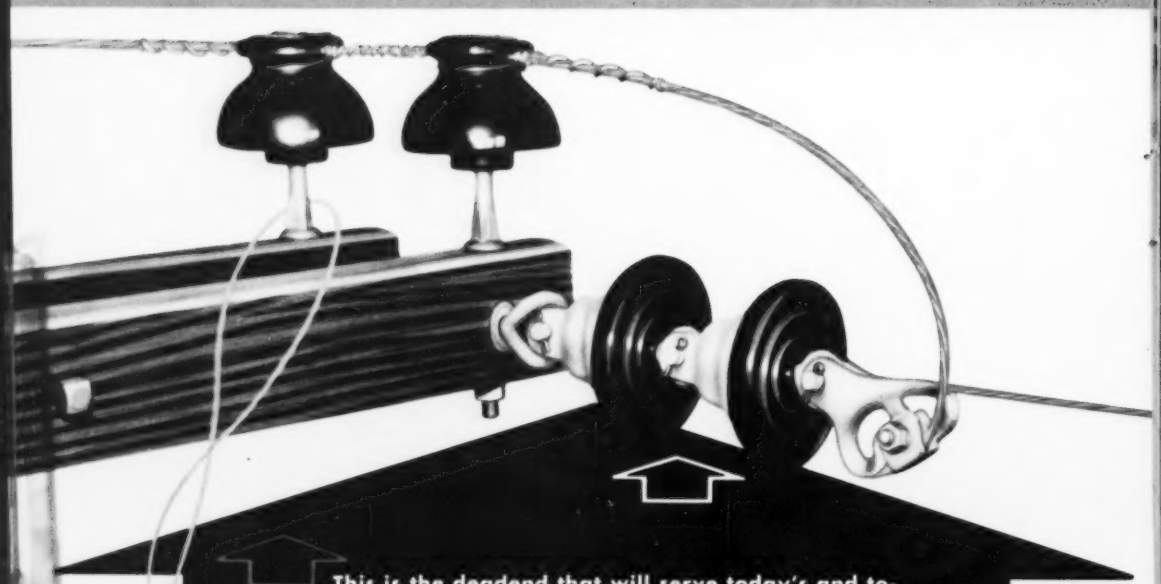
Realistic Ratings for O-B Thorex Arresters

Catalog average ratings and protective tolerances are only *factors* in arriving at the true picture of lightning arrester performance, namely, MAXIMUM PROTECTIVE LEVELS. These maximums constitute the lower boundary of the protective margin existing between arrester function and apparatus insulation strength. The lower this level, the greater the protective margin . . . In its modern listings of Thorex lightning arresters, O-B makes it easy to determine maximum protective levels -- they are specifically tabulated, requiring no further interpretation. Maximums are what you really buy in an arrester -- maximums are what we list . . . And you will find on examining these listings that for greatest protection per dollar you can't match the O-B Thorex.

Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*



This is the deadend that will serve today's and tomorrow's rapidly mounting primary distribution voltages . . . build it only once for economy . . . insulate it adequately . . . you can't plan as far into the future as this deadend will live when you specify O-B materials.

Ohio Brass

MANSFIELD, OHIO, U.S.A.

4221

Insulation Tester

(*Continued from page* 152)

flash equipment. For instrument checking, a "good" condition would be indicated by a slight kick of the pointer when the probes are touched to the circuit under test, followed immediately by its return to the infinity mark or very close to it. A sustained deflection of about 50 megohms or any unsteadiness of the pointer is looked upon with suspicion and warrants further investigation.

A word of caution—capacitors, having voltage ratings below the open-circuit voltage of the tester, may be damaged if an attempt is made to check them with this device. On the other hand, any capacitor checked should be carefully discharged immediately afterwards for safety reasons.

INSULATING BREAKERS used by Cleveland Electric Illuminating Co include primary feeder unit (left); arc circuit breaker (center); strain holder with eye-bolt and clevis

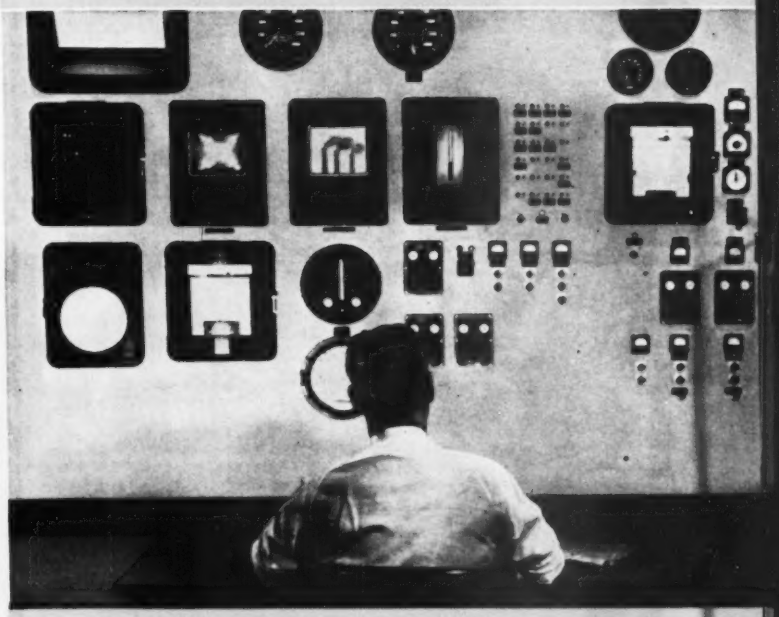
Insulating Breakers Save Time and Copper

Use of three new types of insulating breakers on its distribution system is reducing installation time and saving substantial amounts of copper wire for Cleveland Electric Illuminating Co. The breakers operate on this principle: wires are inserted in the breakers and are gripped automatically by jaws.

First type of breaker tested and adopted for future installations by the company was the arc circuit breaker for series street lighting circuits. This device "breaks" the primary wires at each street lamp.

A larger type of insulating breaker

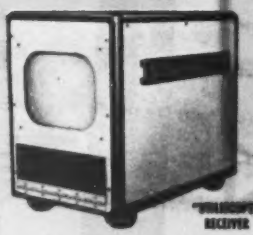
DIAMOND "UTILISCOPE"
(WIRED TELEVISION)
improves Centralized Control



Operator in central control room of large power station "SEES WHERE HE CAN'T LOOK". Here he watches flame conditions in boiler furnace, stack smoke discharge, and water level in boiler on "Utiliscope" screens of control panel.

Centralized control is much more effective if it brings a SENSE OF REALISM into the control room . . . if the operator can actually see what is going on outside his range of vision instead of depending upon indirect interpretations of operating conditions. The electric power industry has accepted the "Utiliscope" as an important factor in achieving better centralized control (as shown above).

The "Utiliscope" has many other uses in industry where its low cost is quickly amortized by improved operation, greater safety or savings in labor. It is surprisingly simple and requires no special skill for installation and operation. Stability and reliability are exceptional. For information on a wide variety of cost-cutting operations, ask for Bulletin 1025T.

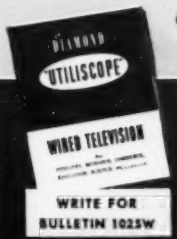


"UTILISCOPE" RECEIVER

"UTILISCOPE" CAMERA

OTHER USES—Watching flow of molten metal • Studying destructive tests of engines
Viewing nuclear research • Coordinating materials flow on conveyors.
The "Utiliscope" (Registered U. S. Patent Office)

4745



WRITE FOR BULLETIN 1025W

DIAMOND POWER SPECIALTY CORP.
FIRST IN INDUSTRIAL TELEVISION
LANCASTER, OHIO • OFFICES IN 29 PRINCIPAL CITIES
Diamond Specialty Limited.—Windsor, Ontario
Since 1903, Diamond has Manufactured
Quality Equipment For Industry

BERMICO®

THE CONDUIT THAT SAYS

"STOP!"

To LEAKY JOINTS: Bermico's joints fit tight. No joining compound is necessary. It makes a water-tight joint.

To ACIDS: Bermico is highly resistant to all types of soil acids and alkalies.

To SHOCK: Bermico Conduit is engineered to take the shocks and stresses of transport—the heavy loads imposed during installation.

To ABRASION: Bermico's smooth inside bore assures quick and easy cable "pull through" without danger of abrasion.

To SLOW DOWNS: Bermico's convenient 8-foot lengths are light in weight, easy to handle. Cutting and tooling can be done quickly, right on the job. All joints are precision milled for speedy installation. Bermico's complete line of bends, plus 5° angle couplings, enables you to overcome unusual field conditions without delay.

For fast installation and dependable protection specify Bermico.

Distributed by

WESTINGHOUSE

Electric Supply Company

Offices in principal cities

BROWN

QUALITY

COMPANY, Berlin, New Hampshire
CORPORATION, La Tuque, Quebec

SOLKA & CELLATE PULPS • SOLKA-FLOC • NIBROC PAPERS
NIBROC TOWELS • NIBROC KOWTOWLS • BERMICO SEWER
PIPE, CONDUIT & CORES • ONCO INSOLES • CHEMICALS

is used on 4340-v, 1/0 primary distribution lines for separating feeders and for booster installations.

Third new type of insulating breaker now in use by the company is commonly referred to as a "strain holder." This device is used for dead-ending primary distribution lines. It differs from the other two types of breakers in that one end consists of an eye-bolt and clevis for crossarms.

TOWER LEGS are steel brushed and inspected for strength. Weakened sections are cut out and new sections of same size are spliced in. Asphalt paint is applied in heavy coat

Maintenance Schedule Extends Tower Life

J. N. STEED, Supt Central Division, Carolina Power & Light Co, Southern Pines, N. C.

Proper maintenance of steel transmission line towers has enabled Carolina Power & Light Co to keep 4,580 towers (most of them erected between 1909 and 1930) in satisfactory condition. At present day prices this steel in place has an estimated value of $6.6 million.

Maintenance schedule of steel towers covers tightening all nuts, replacing all bad bolts or parts and painting any rusty spots or legs. Procedure for painting rusty spots above the ground line is: First, remove all rust and loose paint from spots; rough brush with steel brush or power-driven wire brush and follow with rough fiber brush. Second, apply a heavy coat of Subalox 508 rust-resisting paint.

Adapted from paper presented at recent meeting of Southeastern Electric Exchange

This paint is slow drying and gives a good wetting action. Pigments are a combination of aluminum and lead and produce a weathered steel color.

Procedure for painting rusty tower legs at the ground line is: First, dig a hole 18 in. deep around the tower leg and large enough to work in. Second, clean tower leg by rough brushing with steel brush or power-driven brush, followed by a rough fiber brush; inspect tower leg very closely to make sure remaining material is sufficient to carry the load without reinforcing. If leg does not have sufficient strength, cut out weakened section and splice-in an angle-iron section of the same size. Third, apply a heavy coat of Flintkote C-13 HPC black emulsified asphalt paint. Lastly, fill up the hole.

About every 5 yr paint begins to wear off and rusting starts again. Rather than work all towers every 5 yr, a schedule is set up whereby one-fifth of the tower is worked each year. Crews are required to maintain an average of 33 towers per year.

Trim Snow Laden Trees With 30-30 Rifle

Snow laden trees hanging over distribution circuits are no problem for Puget Sound Power and Light Co's tree-trimming linemen. Instead of chopping down the trees or trimming branches, linemen shoot off the tops of the trees with a 30-30 rifle as shown here by Claude Isackson. This unbalances the snow and causes the trees to snap erect, thus "shivering" off their snow load.

CHANCE

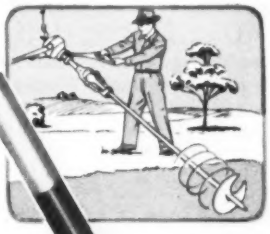
SCREW ANCHORS

. . . . . have a KING-SIZE Thimbleye

for machine or hand installation

Have you tried installing Chance Screw Anchors by machine? It's fast . . . it's economical . . . and it's simple—the oversize Thimbleye on Chance Screw Anchors will readily fit into an adapter that you can get for your hole boring machine. Machine installation saves many costly man hours on big line construction jobs and also solves the installation problem in areas where it is difficult to install screw anchors by hand.

This same "king-size" Thimbleye gives ample room to insert a turning bar big enough for extra leverage in hand installations.



ONE PIECE DOUBLE ARC WELDED ALL STEEL

Chance Screw Anchors consist of separately formed drop-forged steel Thimbleye anchor rods, and helixes with strong, sharp, structural steel blades that are double arc welded (top and bottom) to form an anchor that goes down fast and has exceptional holding power. Blades are correctly pitched to take the right "bite" into the earth for installation with a minimum of effort and earth disturbance. The single groove in the strand-protecting Thimbleye prevents overloading the anchor in regular installations, but a Tripleye rod, for two or three guy strands, is available at no extra cost for special jobs.

You know it's RIGHT when you specify CHANCE

ABC INDUSTRIES

A·B·CHANCE CO·

CENTRALIA, MISSOURI

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C52-8

You should have a copy of "How Much will an Anchor Hold?" This Chance formula tells what type and kind of anchor to use for every guying condition. Write for your copy today.

INDUSTRIAL APPLICATIONS

Westinghouse Electric Corp

FINGER-TIP CONTROL of log carriage drive is permitted by a special regulator paired with magnetic amplifier. Operating and maintenance costs are reduced, operator fatigue is cut, and output quality is improved

Electronic Control Cuts Sawing Costs

Electronic control of a log carriage drive for a huge bandsaw at the Crown Zellerbach Mill, Camas, Washington, has resulted in many benefits since its installation last year. Maintenance and operating cost are lowered, as a result of high drive efficiency. Operator fatigue is reduced (resulting from ease of operation of master switch). Quality of output is improved as a result of definite speed control during sawing. Snappy acceleration and deceleration are permitted. Cable life is increased due to smooth, non-pulsating cable pull. Automatic overtravel protection with emergency stop improves safety. An automatic emergency stop is provided when a-c power is lost, to prevent possible damage to the saw.

A shunt-wound, gearless, traction-type 216-v, 60-rpm dc motor is used on the drive. It is rated at 60 hp continuous or 125 hp peak, and equipped with a 33-in. diameter, spiral-grooved, cable drum.

The gearless log carriage drive is comprised of a dc drive motor, a motor-generator set for supplying power, and the necessary control.

Drive motor is operated over a speed range by armature voltage control, with the drive motor field remaining at full field excitation. For reversal of the carriage, armature voltage is reversed in polarity. Voltage control and, in turn, speed control are obtained by means of controlling excitation (field current) of the main generator.

Natural period of response of this type of generator involves more time than can be tolerated in getting drive up to speed in the short time allowed. To overcome this, a special regulator is used to "force" the generator field to desired level of excitation in desired period of time. In this way, desired rate of acceleration is secured. Likewise, the regulator is used to "force" down level of excitation in the generator at a rate resulting in the desired rate of deceleration.

In addition to boosting accelerating and decelerating rates, the regulator provides a means of limiting armature circuit current to values safe for the equipment. It also prevents creeping when the drive is at rest. The control provides overload protection of the motor.

With the above combination of the regulator and the protective features of the control, it is possible to obtain the maximum performance the equipment is capable of without the danger of damaging overcurrents and overtemperatures.

The current limit feature of the regulator not only protects the electrical equipment from excessive currents, but also protects the carriage and towing rope from excessive mechanical stresses. The carriage is protected from overtravel by limit switches located at each end of the track. The operator has complete control of the speed of the drive, having only to displace the master switch handle in proportion to the speed desired. When he releases the handle for any reason, it returns to the stop position and causes the drive to stop by the normal regenerative braking. Control also provides undervoltage protection.

During deceleration of the drive to a lower speed or to a stop, the kinetic energy of the carriage and carriage motor is fed back to the power system by regeneration at a rate depending on the rate of deceleration. Thus, only the frictional losses and electrical losses are taken from the power system over an operating cycle. In case of ac power failure, or overtravel, drive is stopped automatically by regenerative braking.

Portable Melting Pot

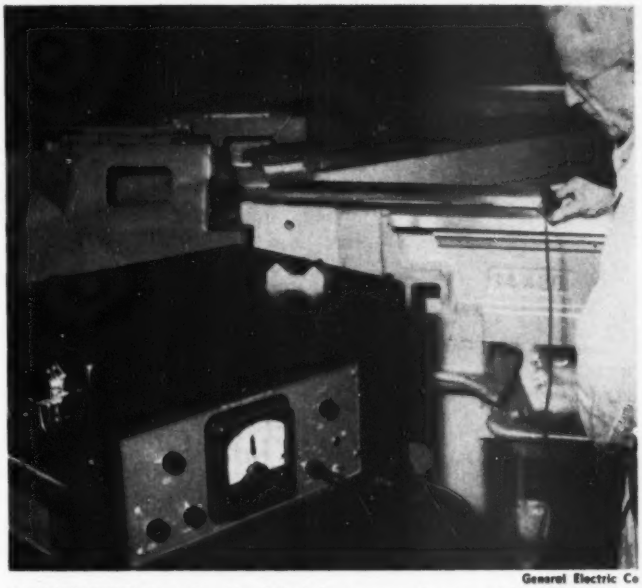
Asphalt heating in portable 5-kw electric melting pot at H. H. Robertson Co, Ambridge, Pa., keeps asphalt in liquid condition. E. M. Wenner, Industrial salesman, Duquesne Light Co.

Metals Comparator Improves Accuracy of Hardness Tests

Hardness of a metal-working lathe-bed way is tested with a metals comparator at the Hendey Machine Co, Torrington, Conn. This manufacturer of toolroom and production lathes subjects all bed ways to the same test in a quality control check of the product.

The lathe-bed ways, after induction hardening, are measured against a master sample which is calibrated at "70 scleroscope." Before the test is run, the pointer on the metals comparator is brought to zero with the test head resting on the standard sample. Then the test is repeated on the lathe-bed way and the pointer indicates whether the bed is harder, softer, or the same as the master sample. If it is the same degree of hardness as the master, or even harder, the lathe is accepted. Readings are taken continuously along the length of each way and kept in a permanent record.

According to Hendey officials, the instrument is more accurate and much quicker than other methods of testing lathe-bed ways, and is "the only known method of testing bed ways for hardness without leaving a mark on the metal."



General Electric Co

HARDNESS TESTS of metal-working lathe-bed ways are made more quickly and accurately with the use of a GE metals comparator than other testing methods tried by the Hendey Machine Co, Torrington, Conn., according to company officials. They say that it is the only known method of testing bed ways for hardness without leaving a mark on the metal

INDUSTRIAL BRIEFS

Bin Heating for clay storage by 25 kw of curved strip heaters completely eliminates clay freezing, improves the flow of clay through the bin, and assures continuous uninterrupted production at Kopp Clay Co, Mineral City, Ohio. Finely ground clay prior to extrusion, is stored in cylindrical steel bin, 9½ ft diam and 20 ft high. As bin is located in unheated part of factory, during winter months overnight freezing of clay frequently stopped production and many manhours were lost freeing the material. Heaters are thermostatically controlled and concentrated on the bottom 1/3 of bin. G. W. Craiglow, Industrial Power Engineer, Ohio Power Co.

Preparing Oxygen for steel making, in conjunction with two new 7,500-kva arc furnaces in the plant of A. Finkl and Sons, Chicago, is accomplished by heating with 93 kw of immersion heating units. Liquid oxygen is released under pressure in a heat exchanger unit. The immersion heating units heat the water surrounding the liquid oxygen coils to facilitate vaporization. The oxygen is then piped to point of usage. Capacity of equipment is 25,000 cu ft of oxygen per hr. R. B. Englund, Sales Engineer, Commonwealth Edison Co.

Comfort Heating with rugged electric radiant heater simply laid on cold floor cuts through floor drafts in open factory area at the A. E. Bausenbach Co, Buffalo, N. Y. 800-w comfort heater is laid at just the right distance from the lathehand and heats his feet and lower body. E. L. Wiegand Co.

Sauerkraut Aging is aided by 14 18-w ultraviolet lamps at P. Herold & Sons, Philadelphia, Pa. Lamps protect sauerkraut from mold during aging process. Each barrel in the two fermenting and curing rooms is protected by the lamps from microscopic organisms which otherwise would develop and cause kraut to take on a pink hue —reducing quality and top rate saleability. Large weights placed on barrel tops to press out air pockets and fermentation gases (resulting in a foam) increase effectiveness of the ultraviolet. Lamp radiations prevent bacteria from attacking foam as it is formed on barrel tops and prevent mold which causes discoloration and waste. L. Albertson, Application Engineer, Philadelphia Electric Co.

Infrared Dries Cloth Fast

Cloth drying time is cut to one-quarter previous time required at Lion Brothers Co, Baltimore, Md. with infrared lamp banks. The drying room, which used to be major production bottleneck now is able to keep up with increase in output of embroidered emblems. When embroidered cloth, containing hundreds of emblems, arrives at drying room, it is brushed with a specially prepared paste. Drying equipment consists of several large frames, each containing seventy-two 250-w infrared lamps. Frames are mounted on rollers and are moved along cloth as each section dries. Paste is prepared in electrically-heated 12-kw kettle. Hot water is supplied from electric hot water heater. Ralph C. Young, Industrial Eng. Rep. Consolidated Gas Electric Light & Power Co.

LIGHTING DEMONSTRATION, one of a series of 14 which provided 45 requests for lighting layouts from a 400 attendance of commercial customers and electrical contractors in Atlantic City Electric Co territory. Here Charles M. Hogan, vice pres of ACE Co, welcomes the assembly

Lighting Shows Stir Up Interest

GEORGE N. DIGN, Commercial-Industrial Supervisor, Atlantic City Electric Co, Atlantic City, N. J.

In presenting a program "Modernization with Planned Lighting" 45 requests for commercial lighting layouts were received by Atlantic City Electric Co. This number of requests resulted from a series of demonstrations of light sources and fixtures for use in modern merchandising. The "shows" were held in 14 district offices during 5 weeks of late 1957.

Cost was approximately $6 per customer based on 400 attendance (316 commercial customers and 84 electrical contractors) at the 1½-hr shows. This cost and time is in contrast to lighting representatives calling on the same number of prospects.

All in attendance registered and a door prize was given at each demonstration. By this method the utility's representatives actually know who attended and a list was prepared for follow-up calls.

A total of 4400 invitations were mailed. In each district the invitations were sent 10 days before the show. If an acknowledgement was not received within 5 days, the commercial representative sent a memorandum about the meeting, including a copy of the program and a postpaid reservation card. Just two days before the meeting another postcard reminder was sent to those customers who planned to attend. A final reminder was made the day of the show; a "flying squadron" called and phoned the customers.

The demonstrations were conducted by members of the Commercial and Industrial Departments of utility. Taking the demonstrations to the district offices or other appropriate meeting place, rather than division offices, the messages went directly to the customers.

At each meeting the following were presented: The Science of Seeing and Store Lighting; A Demonstration of Old and New Lighting Sources; Fluorescent Lamps and Their Effects on Color; Utilizing Light in a Modern Store; Back Light Applications; and A Preview of New Fixtures.

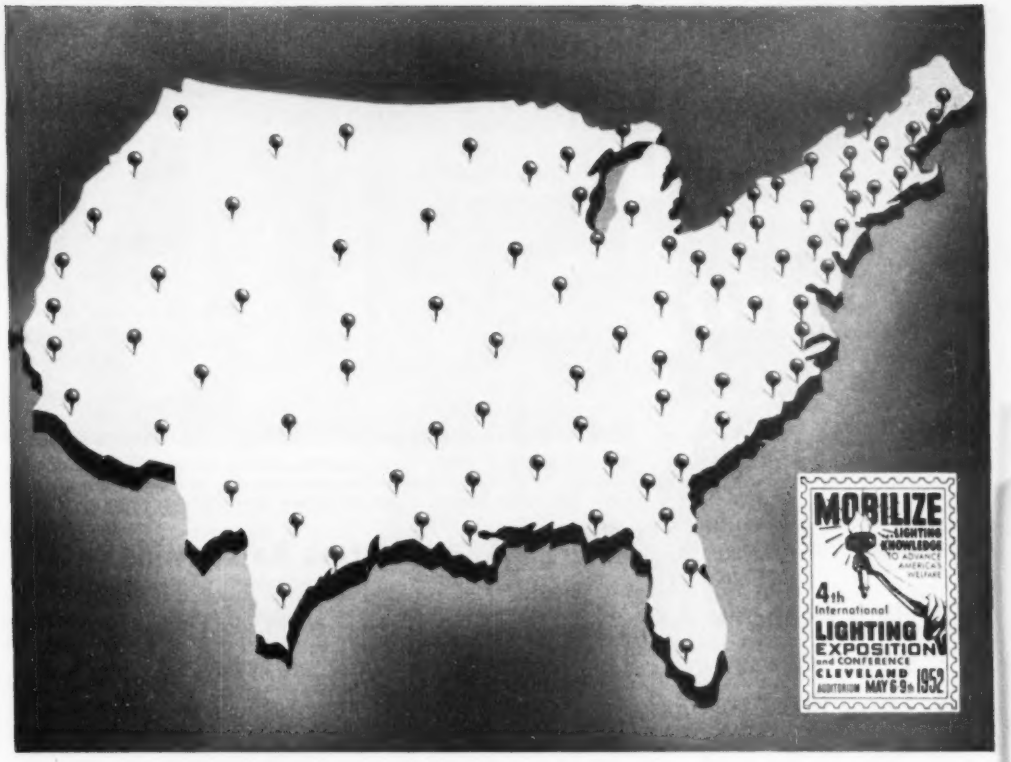
Electric Cooking Profits Former Owner and New

R. W. STEWART, Power Sales Manager, New York State Electric & Gas Corp, Binghamton, N. Y.

Installation of all-electric cooking equipment to replace new bottled gas equipment is producing beneficial results for the new owners and provided unexpected results for the former owner of The Poplars restaurant, Binghamton, N. Y. Main benefits of three 25-lb, electric, deep-fat fryers, which replaced three 60-lb gas fryers, are (1) a better frying job with less fat required; and (2) a reduction in cleaning time to less than one-half that required for the gas equipment. Cleanliness and attractiveness of the all-electric kitchen is held to be the main reason why the restaurant was sold at an attractive price shortly after the electric equipment was installed.

ALL-ELECTRIC COOKING is nice to work with, according to wives of new owners of The Poplars restaurant, Binghamton, N. Y. Units installed to replace new gas equipment include deep-fat fryers, range and broiler. Roll warmer, coffee maker and toasters are also electric

The Poplars serves about 3,300 lunches and dinners per month, including employee meals. The restaurant's installation includes three 10-kw fryers, a 21.9-kw range, a 10.5-kw broiler, a 2-4-kw coffee maker, two toasters rated at 2.45 kw total, and a large roll and food warmer of 1 kw. Total installed capacity of the equipment is 70 kw. Maximum demand was increased by only 24 kw.



How to put <u>your</u> company on this map

THERE are 88 electric service companies represented on this map. A short while ago, there were only 50. Soon there'll be many more. They all have one thing in common — a Light Conditioning program.

There are good reasons why *your* company should be on this map.

With Light Conditioning, your customers have the kind of lighting that's been proved best by top-ranking lighting experts. Light Conditioning is based on the General Electric Home Lighting Recipes which insure the right light in the right place.

Light Conditioning gives you a rallying point around which to concentrate your efforts in improving lighting standards. Since Light Conditioning is basically a program for conserving eyesight and bettering the beauty and comfort of people's homes, it offers tremendous public relations possibilities.

To learn how you can get a Light Conditioning program underway in your service area, call your G-E Lamp District Office, or write Lamp Division, General Electric, Department 166-EW-4, Nela Park, Cleveland 12, Ohio.

You can put your confidence in —

GENERAL ELECTRIC

Combines All Four

EVERY requisite that sound construction needs demand are combined in *Crapo* Galvanized Steel Strand—

1. High strength
2. Ruggedness
3. Long life
4. Economy

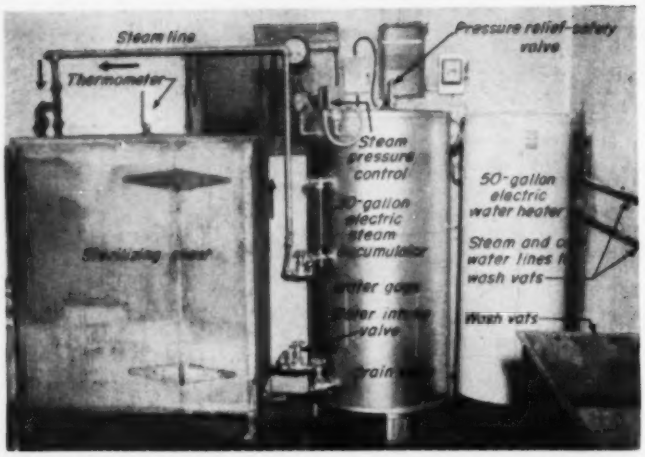
The superior tensile strength inherent in steel is utilized to fullest advantage in each size and grade of this time-proved strand. The heavy, ductile, tightly-adherent galvanized coating—applied by the famous *Crapo* process—provides dependable protection to the steel, extends the life of the strand beyond the normal period of replacement.

Specify *Crapo* Galvanized Steel Strand for guys, messenger and overhead ground wires! There is a size and grade for every practical need available for prompt shipment.

ASK YOUR JOBBER!

Consult your nearest distributor of *Crapo* Products or write direct for further information!

INDIANA STEEL & WIRE CO.



ELECTRIC ACCUMULATORS eliminate dairy house flues and save building costs. They can be installed immediately adjacent to sterilizers and operation is much cheaper than flame-type boilers, with no odor, no ashes or dust, and no open flame. Users like them

Electric Accumulators Raise Milk Profits

L. L. KOONTZ, System Rural Sales Supervisor, Appalachian Electric Power Co, Roanoke, Va.

Dairymen in A.E.P. Co territory are saving thousands of dollars in new building costs by installing electric accumulators in their existing milk rooms adjacent to their sterilizing chests or cabinets. Their operating cost is much cheaper than flame-type boilers. The cleanliness, convenience, maintenance, and safety of the electric units provide better quality milk for the Maryland-Virginia Milk Producers Association and our local dairymen are selling their milk for almost double the former price.

Agricultural engineers, in helping farmers develop a profitable outlet for their milk, cooperated in complete tests on both 30- and 80-gal sizes of electric steam accumulators installed in local dairies. As a result of these tests, approval was given both of these sizes of accumulators by the Virginia Dairy and Food Commission and the Maryland and Virginia Milk Producers Association, Inc.

Conventional-type electric dairy sterilizers were not acceptable to the Association. Their members were using oil or coal-fired boilers as a method of producing "raw steam" for sterilization. This posed a very real and expensive problem for the prospective Lynchburg producers in that they would have to construct another room onto each of their present milk houses in addition to purchasing and installing the flame-type boiler and related equipment.

In actual operation the 80-gal electric steam accumulator operating in connection with a 10-can utensil cabinet on a farm milking 20 cows, used an average of 1 kwhr per cow per sterilization. It is equipped with a 3,000-w electric heating element operating at 230-v. In addition to "raw steam" for sterilization, it produced the necessary hot water for the dairy.

The 30-gal electric steam accumulator operating in connection with a 6-can utensil cabinet on a farm milking 20 cows used an average of 0.69 kwhrs per cow per sterilization. It is equipped with a 1500-w electric heating element operating at either 115 or 230 v. It also produced hot water for other uses in the dairy.

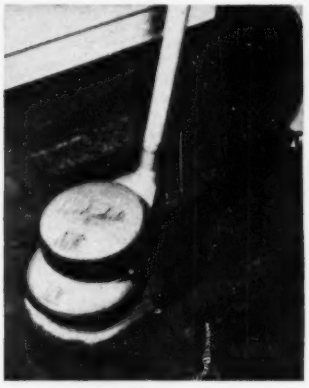
It is estimated that the farmers on our lines can operate these accumulators for about $10 per mo, resulting in some real economies for them in addition to the many other advantages. At first glance, the 30-gal unit might appear to be the best purchase—however, this is not necessarily true since the 80-gal unit allows ample capacity for further herd expansion, which incidentally is generally the experience of the majority of producers.

At a meeting of the local Association last year, orders were placed for

twenty-three 80-gal and two 30-gal electric steam accumulators. The Washington organization has as its goal 200 producers from this area within a two-year period who will be users of electric steam accumulators. The dairymen in the area have already purchased three carloads of accumulators.

Our agricultural engineers did not stop there. To insure that all milk producers get the best from their electric accumulators they contacted an old experienced boiler man in the area who agreed to install all units, including cabinets and wiring, at a fixed price of $35 each. He also agreed to keep any necessary repair parts in stock and to service the equipment at all times for the producers.

If this project expands and develops as rapidly as expected, it is anticipated that, in the not too distant future, a $100,000 milk receiving station will be located in the Lynchburg District to care for the producers.



A Polisher, Too

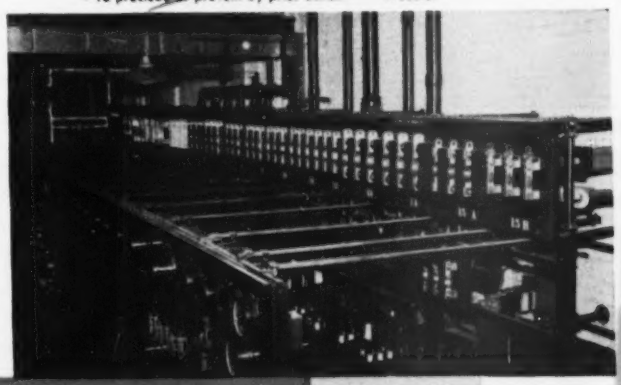
A new device, a vacuum cleaner driven polisher, has been added to the attachment list for the Westinghouse tank-type cleaner. The design of the unit makes it possible to polish or scrub close to walls and corners. It has rubber bumpers to protect furniture. The turbine-like mechanism has only two moving parts and grease-sealed ball bearing eliminates oiling of the unit.

The brush for polishing and scrubbing is six and one-half inches in diameter and is equipped with an easy-to-attach lambs wool buffer for a superfine finish. A side handle also comes with the unit that enables the user to polish furniture and the family car.

Anticipate* Destruction

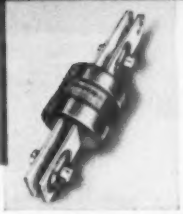
Amp-trap PREVENTS DEVELOPMENT OF HEAVY SHORT CIRCUIT CURRENTS

* To preclude or prevent by prior action — Webster



SHAWMUT Amp-trap*

"T. M. REG. U. S. PAT. OFFICE"



Amp-trap installation at Bird & Son, E. Walpole, Mass., raised the interrupting capacity of the system from 20,000 amperes to 100,000 amperes R.M.S. at 600 Volts, 60 Cycles.

NEW, LOW-COST SHORT CIRCUIT PROTECTION

Amp-trap, with its 100,000 RMS Interrupting Capacity, opens the circuit so fast that it *precludes* the development of the peak available short circuit current. Consequently, it *prevents* both magnetic and thermal destruction. Even phase-to-ground faults are cleared so quickly that multi-conductor faults are usually avoided.

CERTIFIED AND APPROVED

Amp-trap is listed by Underwriters Laboratories. Interrupting tests up to 202,000 amps at 500v 60 cycles have been witnessed and certified by Electrical Testing Laboratories, Inc. Amp-trap is favored by many insurance companies.

FOR SYSTEMS OLD OR NEW

Amp-trap is supplied in all standard ratings up to 4000 amperes for application on any circuit up to 600 volts AC or DC. It can be used on either old or new switchgear with a minimum of structural rearrangement. "Outage" time for installation is negligible. There is no better way to insure your investment in switchgear, bus-ducts, motor starters, circuit breakers and current transformers. Every service entrance on a network system needs Amp-trap protection. The list of Amp-trap users reads like the Blue Book of American industry. Investigate now.

"You Can Get Amp-traps"

WRITE FOR FREE AMP-TRAP BULLETIN TODAY.

REGISTERED UNITED STATES PATENT OFFICE

AMP-TRAPS — *Hinkle At The Switch*

THE CHASE-SHAWMUT CO.

370 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

Amp-trap Trion -td- C-O-T C-O-T -O-T- PERM-WIRE

NEW EQUIPMENT

Lighting Fixture

Developed by a group of engineers at M. I. T., this Day-Brite PBM lighting fixture is a fully enclosed luminous indirect fixture. It reduces maintenance to a minimum and assures long life and trouble-free operation.

The unique construction and simplicity of parts makes the fixture simple and easy to install. It can be installed as an individual unit or in a continuous run.

Adjustable hangers provided for these units allows the entire fixture to be lined up after it has been installed. Swivel fittings allow self-leveling of the equipment.

The fixture is available for two 40-w flourescent lamps, two 40-w Slimline lamps, and two 60-w Slimline lamps. Fixture is Underwriters' approved.

Day-Brite Lighting Inc, 5425 Buliver Ave, St. Louis 7, Mo.

Instrument Pen

New industrial instrument pens that eliminate flooding and reduce paper plugging and choking have been designed.

Pens have removable tips and a new reservoir construction which eliminates flooding because the effective ink level is always below writing tip.

The writing tip is of platinum alloy.

Minneapolis-Honeywell Regulator Co, Wayne & Windrim Ave, Philadelphia 44, Pa.

Cyclometer Register

An improved cyclometer register for the GE single-phase, I-30 and most polyphase watthour meters has been developed recently by the company.

Increased legibility of the cyclometer register has been accomplished by using figures four times the average size, and a unique magnetic storage

and release effect which eliminates partially turned or obscured figures.

General Electric Co, Schenectady 5, N. Y.

Transposition Brackets

Two new transposition brackets have been added to the Hubbard line. Brackets are designed for heavy loads caused by long span construction, corners and winter icing.

They clamp solidly on standard 3¼ x 4½-in. cross arms, with ample give and take to allow for variations in arm dimensions, and eliminate canting or turning. Brackets are

formed of ⅝-in. x 1½-in. galvanized steel with 11/16-in. pin holes and ⅝-in. screw holes for use with wood lag screws.

Hubbard and Co, Pittsburgh, Pa.

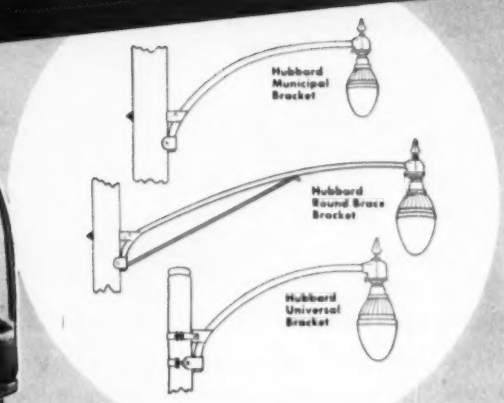
Hot Line Wire Cutters

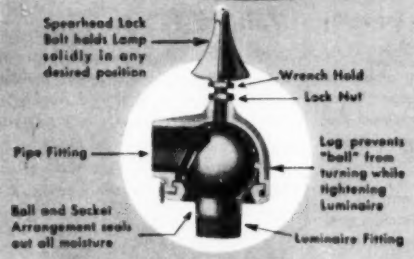
This complete line of hot line wire cutters and bolt cutters now offers heat-treated, drop-forged handles, plates and jaws. Greater strength and rigidity is claimed as is an overall reduction in weight.

Company claims the patented gear principle provides extreme simplicity in design.

Interstate Drop Forge Co, 4051 N. 27 St, Milwaukee, Wisc.

THE *Adjustable* HUBBARD LEVELITE* SOLVES STREET LIGHTING PROBLEMS




Spearhead Lock Bolt holds Lamp solidly in any desired position
Wrench Hold
Lock Nut
Pipe Fitting
Lug prevents "ball" from turning while tightening Luminaire
Ball and Socket Arrangement seals out all moisture
Luminaire Fitting

A maximum swing of 34° is possible in any one direction, 17° in any direction from the vertical, or center line of the Levelite.

Furnished with 2-inch pipe thread to fit 1¼-inch or 2-inch pipe threaded Luminaire; and with 1¼-inch pipe thread to fit 1¼-inch pipe threaded Luminaire.

*NOW AVAILABLE IN HAPCO ALUMINUM ALLOY AS WELL AS IN GALVANIZED MALLEABLE IRON

The Hubbard LEVELITE allows a wide flexibility in adjusting the luminaire for street lighting installations. Luminaires may easily be plumbed and leveled, even though the pole is as much as 17° from vertical in any direction. Or, they may be purposely tilted to avoid obstructions in the desired path of illumination.

The LEVELITE uses a ball and socket movement, which effectively seals itself against moisture. Permanent setting is maintained by a single "spearhead" bolt and lock nut. Changes in the angle may be made easily and quickly, before or after installation.

Hubbard LEVELITES make an ideal combination with Hubbard Upsweep Street Lighting Brackets, made of Hapco Aluminum Alloy, or steel. Write for bulletins describing them if you don't have copies in your files.

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the Load on Hubbard Hardware!"

FOR CONTINUITY OF SERVICE

BE SURE: Clamping members are designed with ample sections for strength and to transmit maximum contact pressures on conductors.

BE SURE: Clamping members are cast from proper high strength virgin aluminum alloy and in molds made from patterns designed for aluminum castings.

BE SURE: Component hardware is of proper high strength aluminum alloy to prevent fracture of clamping members or loosening of connections resulting from the difference in the coefficient of expansion of dissimilar metals.

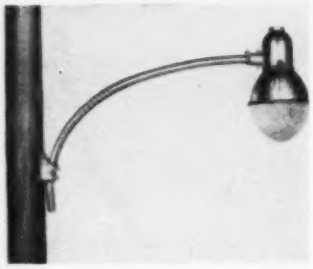
BE SURE: When connecting aluminum to copper conductors that aluminum connector contact areas incorporate heavy gauge copper liners properly bonded to aluminum connector bodies to prevent the formation of high resistance oxide formations from electrolysis between dissimilar metals.

BE SURE: Specify cast aluminum power connectors, bus supports and fittings backed by many years of coordinated electrical, mechanical and metallurgical knowledge in the design and manufacture of these products for the electrical industry.

Write today for Catalog No. 300 on aluminum power connectors, bus supports and fittings.

Consult one of our nearest 18 representatives or contact our main office.

ANDERSON BRASS WORKS, Inc.
POST OFFICE DRAWER 2151
BIRMINGHAM, 1, ALABAMA

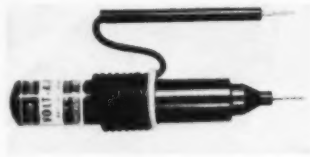


Adjustable Luminaire Bracket

I.M has announced the fabrication of a new single curve, upsweep bracket which features integral plumbing for wide ranges of pole rake. Unit has modern, pleasing lines and is available in steel or aluminum with all conventional types of end fittings.

Bracket mounts easily with a minimum of mounting space. The prewired bracket assembly is attached to the pole by means of an open-slotted pole plate which is slid over a single thru-bolt at the top.

Line Material Co, Milwaukee 1, Wisc.



Voltage Tester

Three separately insulated coils, connected in series, provide the Volt-A-Test with its unusual safe-to-use factor. This patented coil construction is said to eliminate the possibility of short circuits when testing.

Sittler Corp, 18 North Ada St, Chicago 7, Ill.

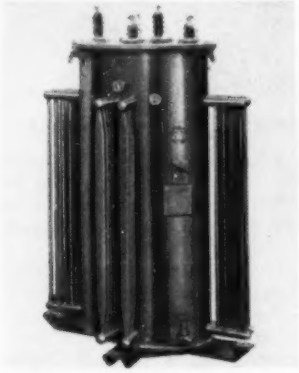
Electronic Wattmeter

This new instrument, designated Model 109, employs an amplifier to drive the potential coil of a dynamometer wattmeter. Several advantages are claimed such as an input impedance of 500,000 ohms, eliminating errors due to potential coil current.

Sensitivity is said to be excellent for low-level circuits, or those with only a small test potential.

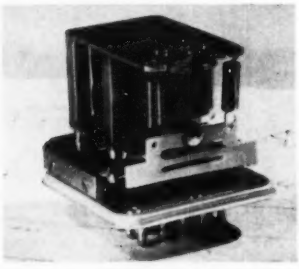
Applications are for transformer

core loss tests, power measurements to speakers, to flourescent lamps, etc. **Keithley Instruments, 3868 Carnegie Ave, Cleveland 15, Ohio**



Transformers

Four new sizes of distribution transformers are available in 167 kva, 250 kva, 333 kva and 500 kva. These units are available in all standard voltages through 44 kv.
Pennsylvania Transformer Co, Box 330, Canonsburg, Pa.



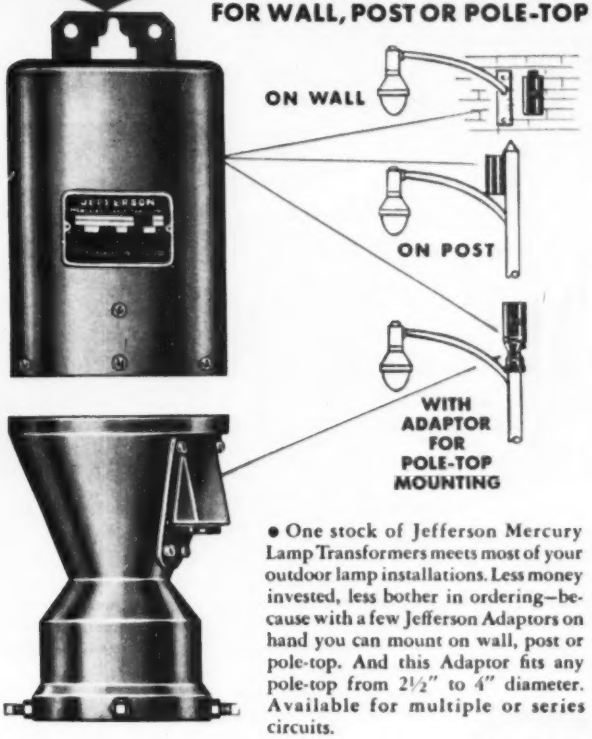
Electric Circuit Controller

The Regohm is a new device for converting low power-level signals into

UNIVERSAL MOUNTING

ONE **JEFFERSON TRANSFORMER**

FOR WALL, POST OR POLE-TOP



• One stock of Jefferson Mercury Lamp Transformers meets most of your outdoor lamp installations. Less money invested, less bother in ordering—because with a few Jefferson Adaptors on hand you can mount on wall, post or pole-top. And this Adaptor fits any pole-top from 2½" to 4" diameter. Available for multiple or series circuits.

Single Piece Drawn Steel Case

Compact drawn steel case sheds water like a duck. Besides being hot-dipped galvanized, they have the new "Dur-A-Gray" weatherproof finish—not just weather-resisting.

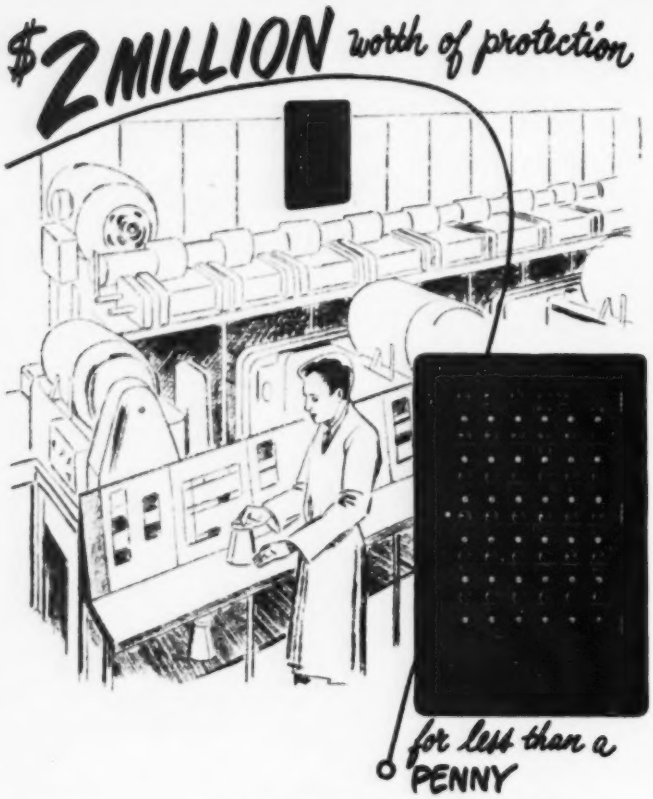
Attractive Gray Color

The color is a rich gray that harmonizes with other equipment or any background. Write today for Bulletin 521-5 containing all necessary data for correct transformer selection.

JEFFERSON ELECTRIC COMPANY
Bellwood, Illinois

JEFFERSON ELECTRIC

JEFFERSON
MERCURY LAMP
TRANSFORMERS



Today, when equipment is so difficult to replace, production and time schedules so critical, manpower so scarce, can you afford to be without the positive help and protection afforded by *AUTH* automatic audible and *Visible Signals*?

PROTECT YOUR EQUIPMENT - - SPEED YOUR PROCESS - - SAVE YOUR PRODUCT by using

AUTH

SUPERVISORY ANNUNCIATORS

Here's how they work: when trouble occurs, a supervisory annunciator receives an electrical impulse from a normally open or normally closed, momentary or maintaining contactor, such as a thermostat, pressure or float switch. This impulse is converted in the annunciator circuit to a maintaining circuit that operates a visible signal indicating the source of trouble, and simultaneously sounds an audible alarm. Various operations sequences are available.

Write today for complete descriptive literature, without obligation!

SINCE 1892 AUTH

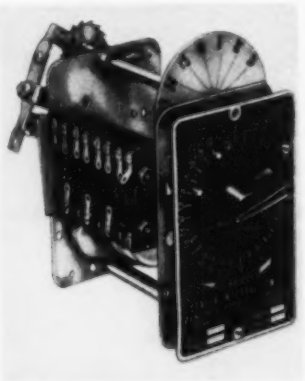
COMPLETE SYSTEMS • ONE RESPONSIBILITY

AUTH ELECTRIC COMPANY, INC.

34-20 45th St., Long Island City 1, N.Y.

MANUFACTURERS OF: Electrical Signaling, Communication and Protective Equipment for Housing, Hospitals, Schools, Offices, Ships, and Industry.

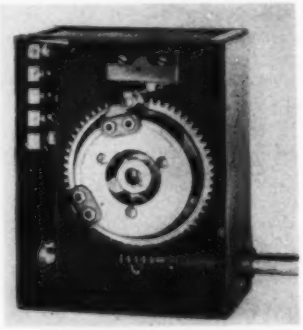
control signals of a much higher power level. A plug-in unit, it is a highly adaptable control which can be used in voltage, current or speed regulation.
Electric Regulator Corp, So. Norwalk, Conn.



Indexing Interval Timer

Equipped with an automatic counting device, the Zenith indexing interval timer is designed to time and tabulate individual steps in an overall operation.

Up to 15 separate steps are automatically registered on the counter dial each time the timer is set for the next part of the cycle. Counter can easily be reset to any reading on the dial.
Zenith Electric Co, 152 W Walton St, Chicago 10, Ill.



Rotating Limit Switch

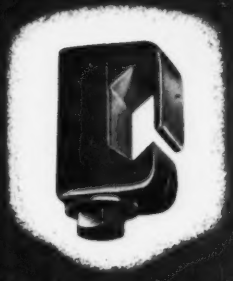
This new switch controls the travel of any rotating device requiring interruption or establishment of electrical current after a predetermined number of revolutions.

The worm gear combination has a

Cut Down th… …and …Margin …ment

With FARGO

A Splice That Requires No Tools



A Connector That's All in One-Piece

…r Easier …stallation

…r Greater …fety

…or Lower …Overall Costs

Fargo Connectors are built like a vise . . . grip like a vise—so they hold wires permanently. They make a vibration-proof contact . . . require no attention after installation—and provide an ideal, low-resistance connection. Last—but equally important—the one-piece construction of Fargo Connectors makes them easier to handle . . . safer to use.

FARGO

Manufactured by

FARGO MFG. COMPANY, INCORPORATED

Pleasant Prairie, Wisconsin

Distributed by

LINE MATERIAL COMPANY

Milwaukee, Wisconsin

LM

for positive control of street lighting

The
FISHER-PIERCE
Series 63300B
PHOTOELECTRIC
CONTROL

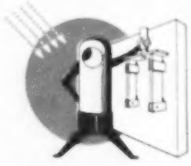
PHOTOELECTRIC CONTROL means the added *safety* of street lighting *when it is needed* — regardless of time of day, season, climate or weather conditions. Control is fully automatic. Even after temporary line power failures the control operates correctly with no need for manual resetting.

FISHER-PIERCE Photoelectric Controls for street lighting have proven themselves in over 35,000 installations made by more than 700 electric utilities.

The electronic circuit of the Series 63300B control provides dependability made possible by over seven years of practical experience. Amplifier tubes consistently have a life of more than 20,000 hours. Other components have much longer life. Units are rated 2500 V.rms hipot to give maximum resistance to the effects of lightning transients. The built-in contactor is conservatively rated to handle a 3000 watt lighting load. The unit has Standard meter socket plug-in construction with cross-arm mounting bracket which gives great installation flexibility.

The control itself gives *truly* economical (*low* purchase cost, *low* installation cost and *low* maintenance cost) and effective service backed by an extensive engineering service organization field experienced in street light control application.

Write for Bulletin 63300B.

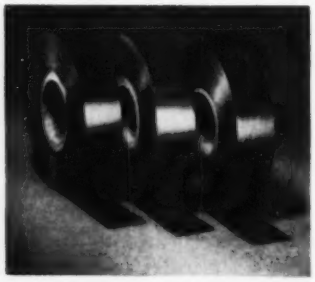


The FISHER-PIERCE CO., Inc.
82 Pearl St., So. Braintree, Boston 85, Mass.

EXPORT: PHILIPS EXPORT CORP. 100 E. 42nd STREET NEW YORK 17, N.Y.

IN CANADA: NORTHERN ELECTRIC CO., Ltd.

60-1 ratio, which should be sufficient for most industrial uses. The number of revolutions can be increased further by various driving sprockets.
Crane Electric Co, 1437 W Lake St, Chicago 7, Ill.



Chemical Resistant Tape

A calendered tape, it is said to possess excellent chemical resistance and high dielectric strength.

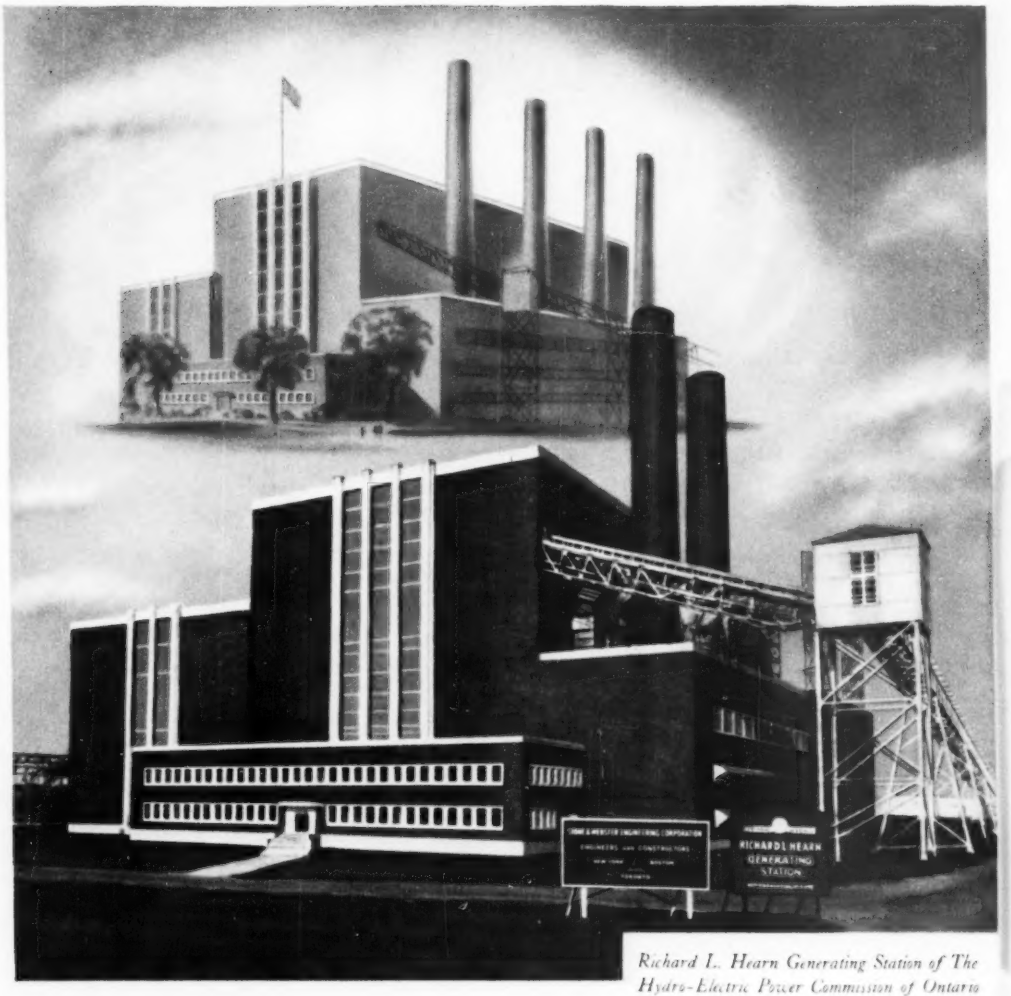
Known as Teneflex 105 Tape, it is a natural selection for use with oil, as in transformers or diesels.
Irvington Varnish & Insulator Co, 6 Argyle Terrace, Irvington 11, N. J.

Sound Level Meter

The new GR sound level meter measures product noise quickly and simply in both the design department and in production. It is also used for studying noise levels in working areas involving worker safety.
General Radio Co, 275 Massachusetts Ave, Cambridge 39, Mass.

Fog Spray Nozzle

A unique fog spray nozzle especially for applying dormant oil base sprays to brush has been developed recently. Manufacturer claims the



Richard L. Hearn Generating Station of The Hydro-Electric Power Commission of Ontario

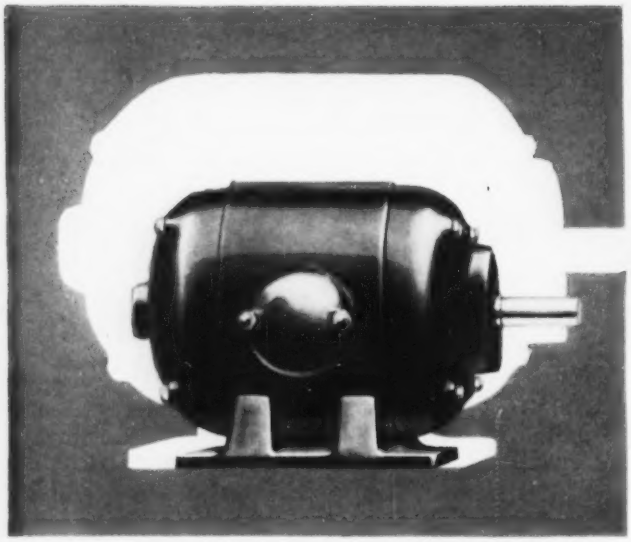
POWER
FOR ONTARIO AND CANADA'S FUTURE..

Designed and being constructed by Stone & Webster Engineering Corporation, this steam electric generating station on Toronto Harbor will supplement existing hydroelectric generating capacity to meet the demands of the fast-growing Province of Ontario.

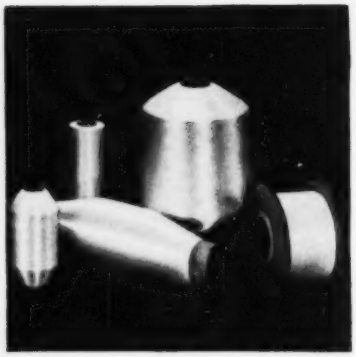
Planned for an initial installation of 400,000 kw, it is expected that its ultimate capacity will be 600,000 kw.

STONE & WEBSTER ENGINEERING CORPORATION

A SUBSIDIARY *of* STONE & WEBSTER, INC.



Outstanding insulating qualities make L·O·F Fiber·Glass a logical choice for use in motors and generators, where space or overloads are factors . . . and on wire and cable. It can be processed on standard machines.



Continuous-Fiber textile yarn with glass fibers of tremendous tensile strength (250,000 lbs. per sq. in.). 150-series glass yarn has many uses, including insulating tape, braided sleeving, and cloth. Withstands temperatures up to 800 F. High dielectric strength.

Libbey·Owens·Ford welcomed as a new source for high-quality electrical insulation

Production of L·O·F Fiber·Glass means an additional supply of efficient insulation for electrical industry

The resources and technical glass knowledge of Libbey·Owens·Ford are now being applied to turning out L·O·F Fiber·Glass.

That is welcome news to the electrical industry, for it means a new source for top-quality electrical insulation, backed by L·O·F's more than 50 years of experience in making fine glass products.

Increased efficiency, reduction in space, the ability to withstand overloads are only a few of the advantages which L·O·F Fiber·Glass offers as electrical insulation. Why not investigate all the benefits this fine product provides?

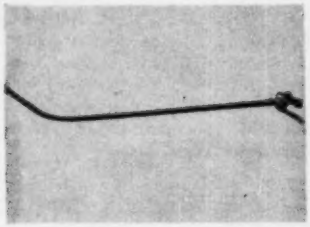
Or if you are now using fibrous glass, then look into Libbey·Owens·Ford as a new and reliable source of supply.

For technical data, or consultation on uses of Fiber·Glass for electrical insulating applications, call your L·O·F office (branches in 24 major cities). Or write, wire or phone Libbey·Owens·Ford, Dept. F·G 1042, Nicholas Building, Toledo 3, Ohio.

LIBBEY·OWENS·FORD GLASS COMPANY
FIBER·GLASS DIVISION

L O F FIBER·GLASS

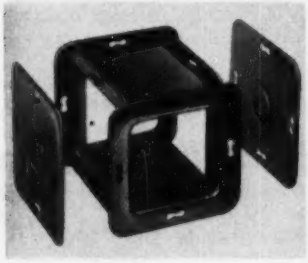
FIBER·GLASS



new nozzle affects savings in materials and labor.

The nozzle, called the HX5, disperses a flat fan pattern of infinite-sized fog droplets in an accurately controlled 10 to 20 degree spray fan. Nozzle is lightweight, inexpensive, and designed for easy one-man operation.

Bete Fog Nozzle, Inc, 85 Pierce St, Greenfield, Mass.

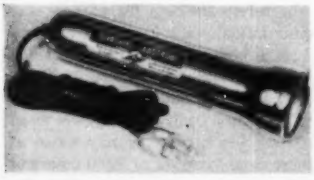


Junction Box

A 2½-in. by 2½-in. flanged wiring junction box has been developed. New wiring economies are planned since they can readily be used in place of more expensive elbows, tees, and crosses.

Two removable closing plates provided with knockouts are included. All holes for assembly are pierced, eliminating drilling.

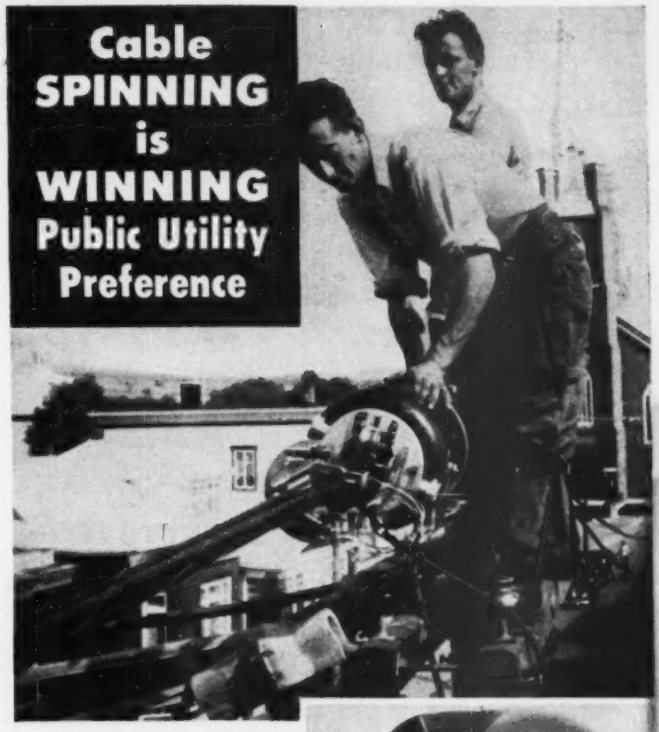
Keystone Mfg Co, 23328 Sherwood Ave, Center Line, Mich.



Stroboscope Unit

A small, inexpensive, portable stroboscopic unit giving 60 flashes per sec when operated on 60 cycle ac has been

Cable SPINNING is WINNING Public Utility Preference



More and more public utilities every day are turning to the Neale Model "K" Cable Spinner—specially designed for economical and efficient power line use. And here are some of the benefits . . .

It actually costs much less to install spun cable than pre-assembled cable. And, of course, spun cable saves valuable space in open-wire construction in congested areas.

Light weight single conductor cables may be spun in lengths three times as long as pre-assembled cables . . . to save splices and installation labor.

Spinning reduces cable inventories, because 1/c, 2/c and 3/c cables can be spun in the field as required.

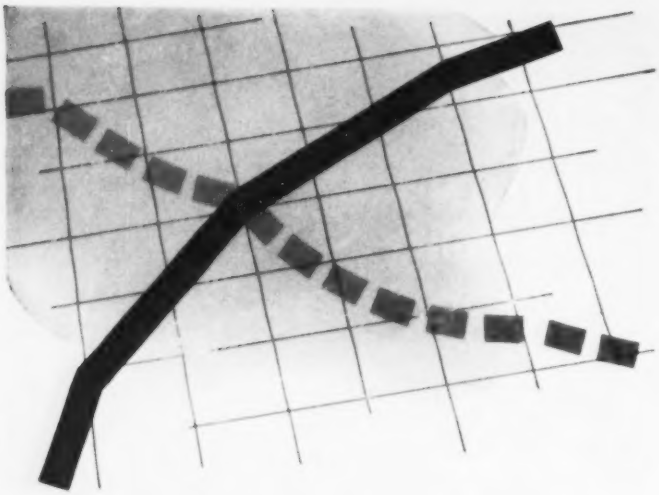
Cable spinning provides a big margin of extra protection against storm damage . . . and has proved invaluable in emergencies of all kinds.

You're invited to send for full technical details on the Neale Model "K". Just drop a line to Cable Spinning, Topeka. *Neale Spinning Wires available in seven different types and sizes.*

Main illustration shows spinning of cable in Canada. Inset is close-up of the Neale Model "K" Cable Spinner, with accessory tools. Model "K" spins a single cable or three 2" cables into a compact triangular pattern. Strand lies in groove formed by two top cables.

HOW IT WORKS. Drum rotates when its two friction drive wheels respond to pulling of wire. Drum revolves once when 13" of wire is pulled — regardless of condition of strand. Drum carries two spools of wire, spaced to spiral 6½" apart for ample cable support. Magnesium castings used wherever possible for lightness and strength. Weight is only 36 pounds. Length 18½", 12" diameter, 4¼" wire exit.

CABLE SPINNING EQUIPMENT CO.
TOPEKA, KANSAS Phone 2-7234-5



A SOUND RATE STRUCTURE
is the key to adequate earnings

Basic economic analyses affecting pricing policy

Analysis of factors influencing rate design

Studies involving rate base, cost of money, rate of return

Preparation and presentation of expert testimony in rate proceedings

Cost of service analyses

Continuing research and reports on economic, commercial and engineering developments affecting rates

Rate audits

INVESTIGATIONS
REPORTS
FINANCING
ACCOUNTING
TAXES
INSURANCE
PENSIONS
RATES
DEPRECIATION
VALUATIONS
CONSULTING & DESIGN ENGINEERING
METERING
PURCHASING
INDUSTRIAL & PUBLIC RELATIONS
MERCHANDISING
ADVERTISING
GAS CONVERSIONS

Write for our booklet describing our services.
Address: Commonwealth Services Inc., Department E,
20 Pine Street, New York 5, N. Y.

Commonwealth Services Inc.

and subsidiaries

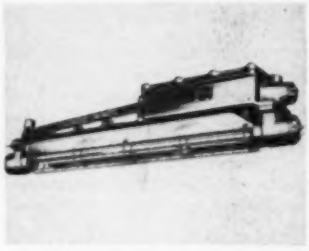
COMMONWEALTH ASSOCIATES INC.
COMMONWEALTH GAS CONVERSIONS INC.

20 Pine Street, New York 5, N.Y.
Jackson, Michigan *Washington, D.C.*

announced recently by Berkshire.

The lamp used is a standard neon bulb having long life and is readily obtainable when a replacement is needed. Instrument is the same size as a standard two-cell flashlight.

Berkshire Laboratories, 528 Beaver Pond Rd, Lincoln, Mass.



Explosion Proof Fixture

This type EVF explosion-proof germicidal lamp is designed to accommodate singlepin Slimline germicidal lamps.

Fixture consists of a tube of explosion-resisting Vycor glass which houses the lamp and is sealed at each end. A rigid structure consisting of the aluminum ballast housing and extension piece supports the two tube end-castings.

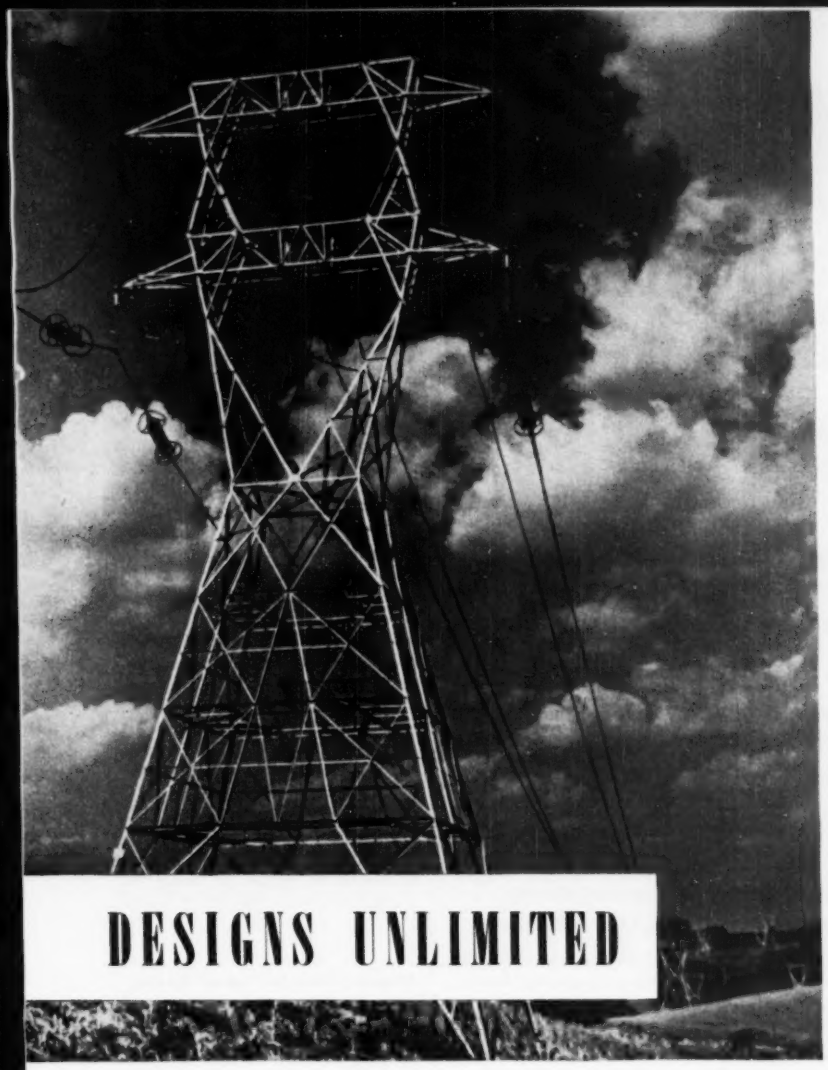
Crouse-Hinds Co, New York, N. Y.

Safety Air Hose

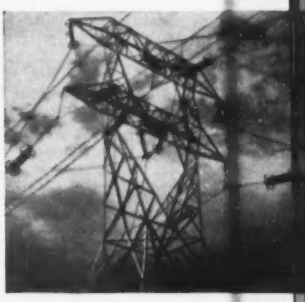
A safety air hose for use on concrete busters, jack hammers, etc, features a high current-carrying braided copper ribbon for secure bonding. This feature is important in the event of accidental contact with power lines.

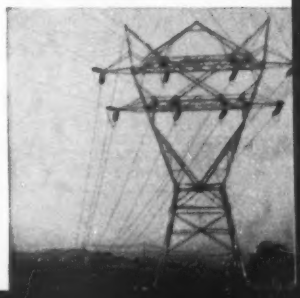
Hose has been reportedly tested at short circuit current of 2250 amp and 480 v, proving it can be held without any danger of electrical shock to the operator.

Mercer Rubber Corp, 66 Reade St, New York 7, N. Y.



DESIGNS UNLIMITED



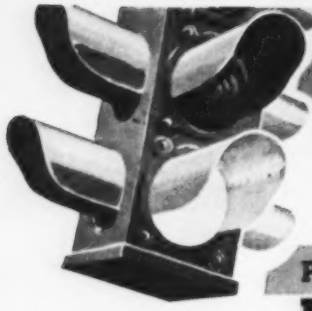


If your engineers have their own ideas on tower design, well and good. We will follow them to the letter and adhere closely to specifications. Your engineers realize, as we do, that despite general similarity no two towers are alike. Each tower must be designed for its particular location and purpose.

Let us apply our four decades of experience in building towers for any and all conditions of terrain and load, to your power transmission problems.

BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY
2013 Farmers Bank Building, Pittsburgh 22, Pa.

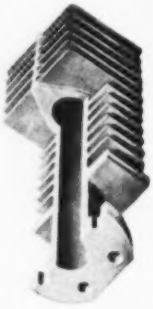
BLAW-KNOX
TRANSMISSION TOWERS



GREEN

PREMIER DIAMOND ECONOMIZERS

Good Parts are Essential to a Good Machine . . . Let's examine a Green Fuel Economizer—Type 25—and study the major parts.



FINNED CAST ALLOY IRON TUBES WITH DIAMOND SHAPED SECTION

The diamond shape provides less restricted gas flow; easy cleaning and clearview inspection. The fins provide maximum heating surface in given space.

SEPARATE SUPPORTING AND JOINTING FLANGES

Supporting flange is separate from and independent of jointing flange. Jointing flange is not exposed to hot gases. Through bolts rather than studs are used to connect jointing flanges.

CORRECTLY PROPORTIONED, STRONG CONNECTION BENDS

These are designed to provide needed flexibility with strength. Flanges on tubes, bends and manifolds are accurately machined.

Green specially designed Soot Blower assures thorough cleaning.

Green Type 12 Premier Diamond Economizers—the Steel Tube Units—are made up of equally strong and well designed parts. Send for Bulletin No. 169.

THE GREEN Fuel Economizer COMPANY INC.

BEACON 3, NEW YORK

ECONOMIZERS • FANS • AIR HEATERS • CINDERTRAPS

WHAT THEY'RE SAYING

At Industry Meetings

Dollar Export Sales

From the February 29 issue of The Electrician, Newspaper of the Electrical Industry, Publ. in London, England

The long established principle of "Buy American" has recently been subjected to much criticism in the United States. For one reason because it is contrary to the present foreign policy of that country. This condition was confirmed when eleven American sales executives came here to tell British manufacturers how to sell successfully in the U. S. market.

It has been suggested that the British exporters should establish a beachhead in the U. S. field by making an all out assault upon their public authority purchasing agents. The possibility of such an attack is feared by manufacturers to be tangled in an endless mass of red tape. The figures which the electrical industry is able to produce with respect to exports to the U. S. are excellent but due to our national economy production, they must be even more voluminous.

If American importers would really import rather than just render lip service, not only would our own economy in respect to dollars be better balanced, but so would that of all Europe.

Atomic Power for Industrial Use

HARRY A. WINNE, vice-president of engineering, General Electric Co before Los Angeles sections of the AIEE and the ASME

Although atomic power for industrial use is still in the distant future, atomic energy is already being used to study plant growth and to measure wear on automobile piston rings. In addition, it is being used to detect impediments in pipelines, to aid in determining how metals corrode and to help in the search for better metals for aircraft gas turbines.

The radioactive "fission products" which result from the breakups of uranium may possibly have large markets in various segments of industry. The sterilization of materials, such as pharmaceutical products, without heating is a particular possiblity.

A dual purpose plant making plutonium and selling it to the government

ETL TEST REPORTS*

(On Your Product – Its Parts and Materials)

SAFEGUARD YOUR PROMOTION

Evidence { 112,106 SAMPLES TESTED IN YEAR INDICATE THE GROWING USE OF UNBIASED INFORMATION AS AN AID TO EXECUTIVE DECISIONS ON OPERATIONS IN THESE SHIFTING TIMES.

*GOVERNMENT DEPARTMENTS require more rigid qualification tests than ever, but ETL is now a recommended qualifying agency.

Problems arose

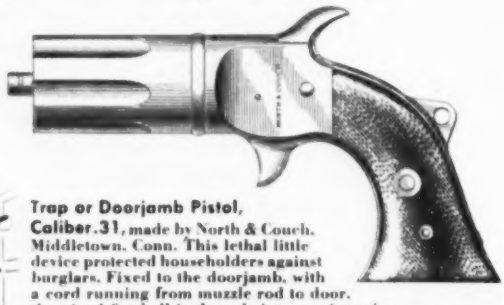
IN 40 STATES

ELECTRICAL TESTING LABORATORIES, INC.

2 EAST END AVENUE at 79th STREET, NEW YORK 21

Famous Guns

Deringer Percussion Pistol, Model 1843, product of Henry Deringer of Philadelphia. Deringer's large caliber, short barreled pocket pistols were so popular that others imitated them—calling them "derringers". John Wilkes Booth used a Deringer to assassinate Lincoln.



Trap or Doorjamb Pistol, Caliber .31, made by North & Couch, Middletown, Conn. This lethal little device protected householders against burglars. Fixed to the doorjamb, with a cord running from muzzle rod to door, the pistol fired all its barrels into any intruder.

Instant-heating

Weller Soldering Gun for light or heavy work. Dual heat greatly increases tip life. Switch instantly to high or low heat as job requires. Pre-focused spotlights end "blind soldering". Exclusive tip-fastening arrangement assures full, constant heat. High-impact plastic housing. Perfect balance. Low-cost replaceable tips. Pays for itself in a few months. See at your Distributor or write for Bulletin direct.

Get SOLDERING TIPS, new Weller Handy Guide to faster, easier soldering. 20 pages fully illustrated. Price 10c at your Distributor or order direct.

Weller BETTER FROM GRIP TO TIP!

SOLDERING GUNS 817 Packer Street, Easton, Pa.

The Finest Soldering Tool for the Finest Craftsmen

and also generating and selling power to the public might prove economically feasible. Such a plant might be profitable long before processes are developed sufficiently economical to permit a plant to recycle its plutonium and produce power only.

Principle of Free Enterprise

W. A. BUCK, vice president and general manager of R. C. A. Victor Div., Radio Corp of America before the annual meeting of the Urban League of Greater Cincinnati

Under the American System the only problem we face today is that of trying to extend the benefits of this system still further to more and more people. Business not only has made our national prosperity, but has made many other great contributions to American civilization, namely mass production, mass distribution, vision, research and merchandising.

In the electronics industry, as in most industries there is an urgent need for skilled people, particularly engineers, because American industry needs the best people, the best brains, the best skills available if there is to be continued progress and greater prosperity.

Future of Atomic Energy

GORDON DEAN, chairman, Atomic Energy Commission before the Economic Club, Detroit, Mich.

The primary objective of the AEC is to make our stockpile of fissionable material bigger. This is why we are undergoing the present two and a half billion dollar expansion program. It is also why the President has said he will ask Congress for an additional five billion dollars.

The point has been reached where private industry is beginning to bring its own enterprise and initiative to bear on the problems of the AEC. Eight companies are presently studying the reactor-development situation. These companies want to know what they can do with their money to get into reactor development with a view toward producing electric power.

One big break the international situation is giving atomic power development is that atomic reactors can be made to produce both power and plutonium at the same time. This means reduced cost of reactors because of the income resulting from the sale of plutonium.

New Westinghouse Fluorescent Mercury lamp Gives Golden-White light

Here's the biggest lighting news since the introduction of the fluorescent tube! The new Westinghouse 400-watt fluorescent mercury lamp produces a golden-white light suitable for practically all industrial lighting. In addition, the J-H1 has all the important mercury lamp advantages of high light output, top efficiency and long life. You can get complete technical data and practical application information by contacting the Westinghouse Lamp Sales Office nearest you. Or simply write the Lamp Division, Westinghouse Electric Corp., Bloomfield, New Jersey.

FOR INDOORS
The J-H1 gives plant interiors golden-white light from standard H-1 sockets; needs no additional equipment other than the usual mercury lamp auxiliaries.

FOR OUTDOORS
The J-H1 is ideal for lighting large areas to combine the efficiency, high light output, and long life of mercury lighting with a whiter light.

YOU CAN BE SURE... IF IT'S

Westinghouse

AGAIN WESTINGHOUSE MAKES HISTORY! Complete coverage of Presidential Campaign from conventions to election over CBS television and radio.

NEWS ABOUT PEOPLE

J. H. WARD C. E. COLLINS O. E. FRY

Ward Elected a VP, Secretary

New official of PS of Northern Illinois holds similar posts with Commonwealth Edison. Two VPs named

In another step toward integration of the operations of Commonwealth Edison Co and Public Service Co of Northern Illinois, J. Harris Ward, vice president and secretary of Commonwealth Edison, has been elected vice president and secretary of Public Service.

Other consolidation moves include the appointment of Fred N. Baxter as assistant secretary of both companies. Malcom A. Tait was elected assistant treasurer of Public Service and also serves in that capacity with Commonwealth Edison. Victor A. Kos, John C. Risins, Paul W. Boyer, and George Klamsteiner, assistant comptrollers with Commonwealth Edison, have assumed similar duties with Public Service.

Division Created . . . The Western United Division and the Western Division of Public Service have been combined into the Western Division with C. E. Collins as division vice president. He was division vice president of the Western United Division. O. E. Fry, formerly division vice president of Western Division, becomes division vice president of Northern Division. Fry, who will make his headquarters at Northbrook, replaces C. E. Parker, who was promoted to assistant general division manager with headquarters at Chicago.

In the newly created Western Division, C. W. Tennant and R. S. Carr were appointed assistant division vice presidents. Tennant will have headquarters in Aurora and Carr in Maywood.

Served on WPB . . . Ward, who started with Commonwealth Edison in 1938, became secretary in 1948 and vice president in 1951. During World War II he served on the War Production Board in various capacities and subsequently in the Army as a major in Strategic Bombing Intelligence in the European Theater of Operations.

Collins, who has been associated with utility work since 1913, was named division vice president of the Western United Division in 1950. Fry, who joined Public Service in 1929, was appointed division vice president of the Western Division in 1951.

Named a Vice President

John J. Radigan, Jr, has assumed his duties as vice president in charge of industrial relations for P. R. Mallory & Co, Inc, Indianapolis, Ind. Previously Radigan had served as industrial relations director for E. W. Bliss Co, Canton, Ohio.

Herbert A. Fox, project engineer on the development of the Parkersburg (W. Va.) factory of the new Fiber Glass Division of Libbey-Owens-Ford Glass Co, has been named technical manager of the division. Fox, who has been with Owens-Corning Fiberglas Corp for eight years, was assigned a year ago to be project manager for the plant under the engineering contract between Libbey-Owens-Ford and Owens-Corning.

William E. Francis has been appointed manager of information services of the Lamp Division of Westinghouse Electric Corp. Francis, who leaves a law practice in Richmond and Lexington, Ky., to join Westinghouse, will supervise informational activities and community and employee relations programs at all plants of the division.

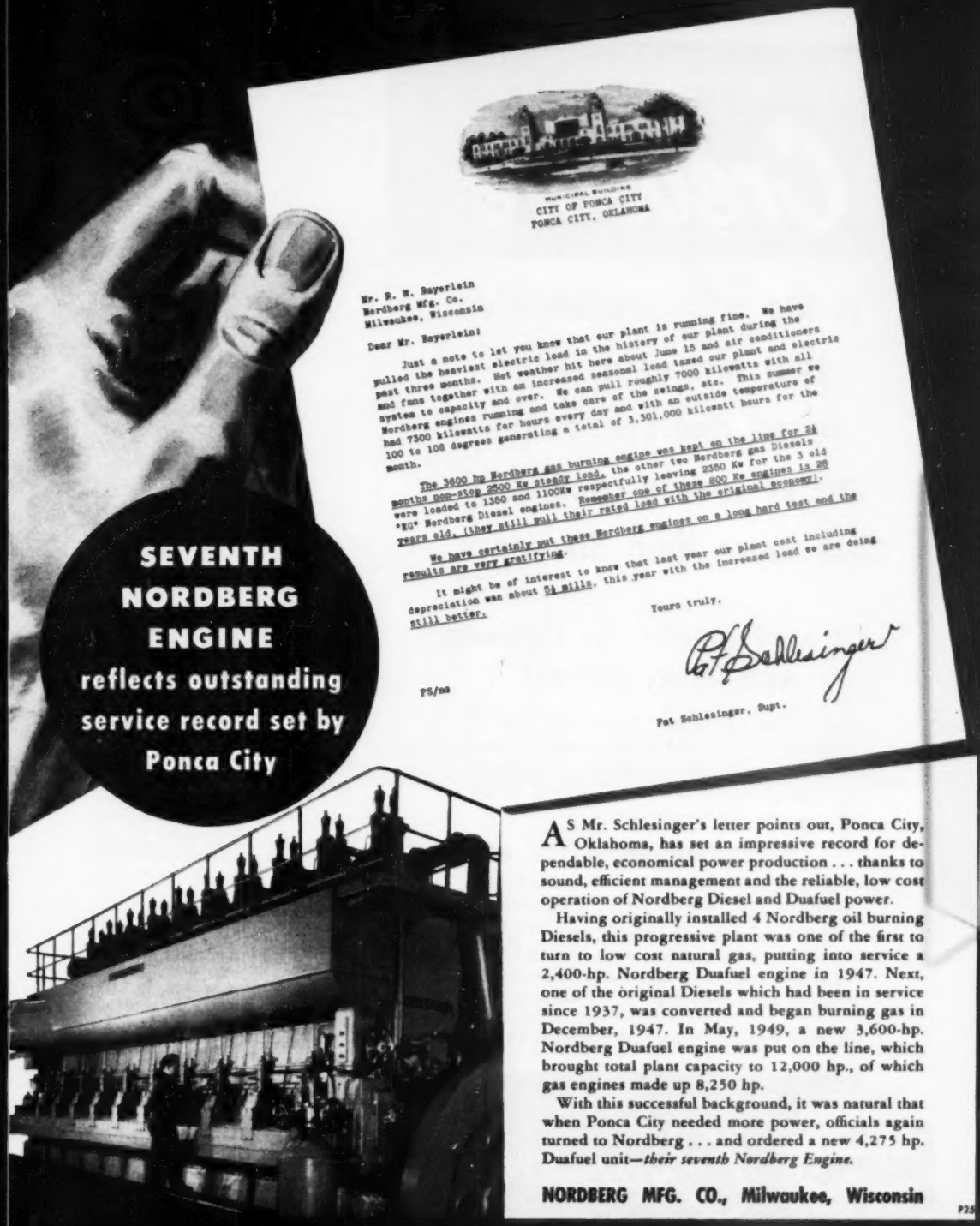
J. Mason Guillory has been appointed director of advertising for New Orleans Public Service, Inc, to succeed **W. J. Amoss,** who has resigned. Guillory joined the company in 1931. In 1940 he was appointed manager of the industrial and commercial division of the Industrial Engineering and Utilization Department. Amoss started with New Orleans Public Service in 1931.

O. G. SCHWENK

Blaw-Knox Co Appoints Otto G. Schwenk a VP

Otto G. Schwenk has been appointed to the newly created position of vice president in charge of industrial products of Blaw-Knox Co, Pittsburgh, Pa. In this post he will have executive responsibilities connected with the manufacturing divisions.

The company also named Arthur A. Levison as vice president and general sales manager of its Blaw-Knox Division. He will administer the sales


CITY OF PONCA CITY
PONCA CITY, OKLAHOMA
Mr. R. W. Bayerlein
Nordberg Mfg. Co.
Milwaukee, Wisconsin
Dear Mr. Bayerlein:
Just a note to let you know that our plant is running fine. We have pulled the heaviest electric load in the history of our plant during the past three months. Hot weather hit here about June 15 and air conditioners and fans together with an increased seasonal load taxed our plant and electric system to capacity and over. We can pull roughly 7000 kilowatts with all Nordberg engines running and take care of the swings, etc. This summer we had 7300 kilowatts for hours every day and with an outside temperature of 100 to 108 degrees generating a total of 3,501,000 kilowatt hours for the month.
The 3600 hp Nordberg gas burning engine was kept on the line for 24 months non-stop 2500 Kw steady load, the other two Nordberg gas Diesels were loaded to 1360 and 1100Kw respectfully leaving 2360 Kw for the 3 old "KG" Nordberg Diesel engines. Remember one of these 800 Kw engines is 20 years old, (they still pull their rated load with the original economy).
We have certainly put these Nordberg engines on a long hard test and the results are very gratifying.
It might be of interest to know that last year our plant cost including depreciation was about 9¢ mills, this year with the increased load we are doing still better.
Yours truly,
Pat Schlesinger
PS/ms
Pat Schlesinger, Supt.

SEVENTH NORDBERG ENGINE reflects outstanding service record set by Ponca City

AS Mr. Schlesinger's letter points out, Ponca City, Oklahoma, has set an impressive record for dependable, economical power production . . . thanks to sound, efficient management and the reliable, low cost operation of Nordberg Diesel and Duafuel power.

Having originally installed 4 Nordberg oil burning Diesels, this progressive plant was one of the first to turn to low cost natural gas, putting into service a 2,400-hp. Nordberg Duafuel engine in 1947. Next, one of the original Diesels which had been in service since 1937, was converted and began burning gas in December, 1947. In May, 1949, a new 3,600-hp. Nordberg Duafuel engine was put on the line, which brought total plant capacity to 12,000 hp., of which gas engines made up 8,250 hp.

With this successful background, it was natural that when Ponca City needed more power, officials again turned to Nordberg . . . and ordered a new 4,275 hp. Duafuel unit—*their seventh Nordberg Engine.*

NORDBERG MFG. CO., Milwaukee, Wisconsin

P25

BUSCH-SULZER
A DIVISION OF NORDBERG

NORDBERG
DIESEL ENGINES

Remember...
Creosote

is the only preservative that has kept wood sound and serviceable under severe conditions for more than 30 years

...creosote proves this statement with service records!

You can count on Koppers for creosote. With 18 creosote-producing and storage plants, Koppers can take care of your requirements. We'd like to give you our quotation when you're in the market for creosote. Get in touch with us.

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Woodward, Alabama	Birmingham 8-1611
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Boston, Mass., 250 Stuart St.	Liberty 2-6525
Los Angeles, Calif., 727 E. Gage Ave.	Adams 3-6231
Pittsburgh, Pa., Koppers Bldg.	Atlantic 1-6240

KOPPERS COMPANY, INC., PITTSBURGH 19, PA.

KOPPERS
All Standard Specifications
Creosote
The Performance-Proved Wood Preservative

and engineering functions for all the division's departments. H. Russell Loxterman has been made assistant general sales manager of the B-K Division. In addition to his new duties, Loxterman will continue as manager of the steel plant equipment department.

Schwenk comes to Blaw-Knox from Yale & Towne Manufacturing Co, New York, where he was vice president in charge of production and a director. Levison, who started with the company in 1923, has been a division vice president in charge of the construction equipment department since 1945.

J. K. HORTON

Horton Named President of Pacific Public Service

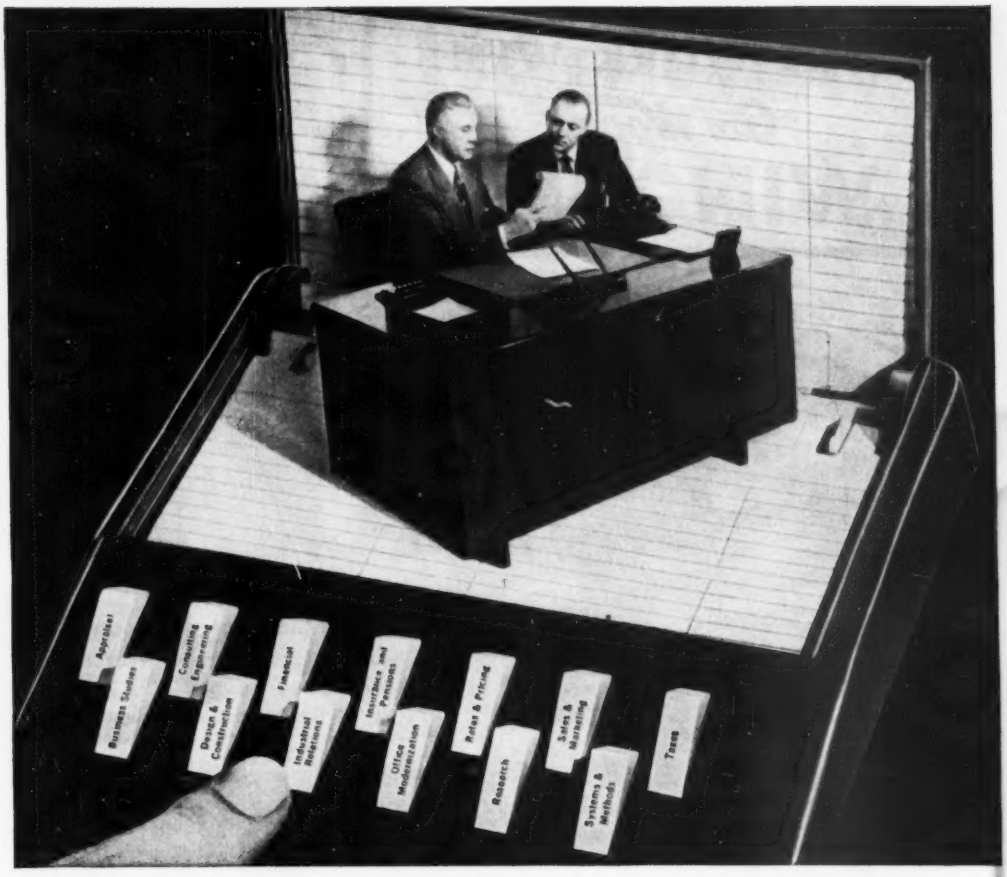
J. K. Horton has been elected president of Pacific Public Service Co, San Francisco, to succeed Ernest G. Lawson who has retired. Horton was also elected chairman of the board of Coast Counties Gas & Electric Co, Santa Cruz.

Since joining Pacific Public Service in 1944, he has served as corporate secretary and legal counsel. In 1951 he was elected executive vice president of the company and its subsidiary, Coast Counties G&E.

Lawson, who has completed more than 40 years in the gas and oil industry, has served as president of Pacific for the past eight years.

New Treasurer Elected

E. Wallace Wilkinson has been elected treasurer of West Penn Electric Co. Wilkinson has been assistant treasurer since 1947. The new treas-



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At your fingertips, through EBASCO, are engineers, constructors, business consultants—specialists who can help solve your most troublesome business problem quickly and economically. Solve it, moreover, without adding permanently to your payroll . . . without disturbing existing company relationships.

Need help with financing? During the past few years EBASCO has advised on the raising of over two billion dollars in new capital. Is industrial relations your current business headache? EBASCO has assisted in planning and developing many outstanding industrial relations programs. EBASCO has devised efficient systems and methods; designed and built over one billion dollars worth of new plants. EBASCO has developed insurance, pension and safety programs . . . made appraisals . . . sales and marketing studies . . . solved production and plant layout problems and performed many similar services for business and industry throughout the world.

EBASCO will do all or any part of a job, for companies large or small. To find out *exactly* how we can serve you best, write for your copy of "The Inside Story of Outside Help." Address: Ebasco Services Incorporated, Dept. M, Two Rector Street, New York 6.

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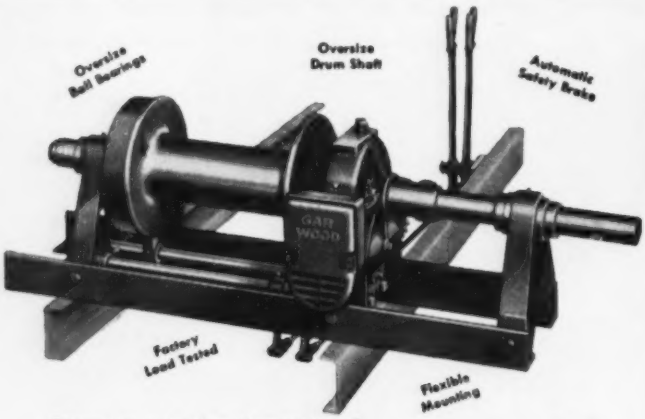
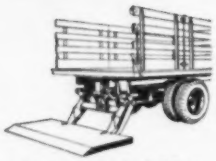
WINCHES



Time-saving and safety characteristics of Gar Wood Truck Winches mean more work per hour . . . exceptionally rugged construction means much longer life and more work per winch. Check the features mentioned above . . . they assure you superior performance from Gar Wood Winches. Capacities from 15,000 lb to 100,000 lb. Write for Bulletin WC-204.



Gar Wood Elevating End-Gate reduces pick up and delivery costs; ask for Bulletin L-101

GarWood

TRUCK CRANES

Power operated, they greatly increase productive truck hours and save many man hours. Require minimum space behind cab. Built in variety of sizes from 2,000 to 24,000 lb. Write for Bulletin WC-202.

52-6

GAR WOOD INDUSTRIES

GAR WOOD INDUSTRIES, INC.

Wayne Division • EXECUTIVE OFFICES, WAYNE, MICHIGAN

TRUCK EQUIPMENT: Dump Truck Bodies & Hoists, Winches & Cranes, Refuse Collection Bodies, Elevating End Gates. CONSTRUCTION EQUIPMENT: Excavators, Scrapers, Dozers, Ditchers, Spreaders, Finegraders, Truck-Mounted Road Graders.

urer, a member of the New York State bar, joined West Penn in 1943 as tax accountant and attorney. He succeeds J. Lee Rice, Jr, who will continue as vice president and director of West Penn.

D. B. POTTER

Monongahela Power Co Names Don Potter a VP

Don B. Potter has been elected a vice president of Monongahela Power Co. The utility also appointed H. O. Sprinkle an assistant to the executive vice president, C. H. Leatham.

The promotions concentrate the company's main operating functions —power generation and power distribution—in Leatham's offices. Potter has been in charge of generation while Sprinkle has been manager of the operations department which includes, as its principal unit, the lines section.

The new vice president started with Monongahela Power in 1929 and became an assistant to the executive vice president in 1950. Sprinkle came to the utility in 1930 and has been manager of operations since 1938. Both Potter and Sprinkle will continue to be on the staff of the executive vice president.

Fitzburgh Named Head of Diamond Power Co

William J. Fitzburgh has been elected president of Diamond Power Specialty Corp, Lancaster, Ohio. He succeeds Willis P. Thomas who was elected chairman of the board.

Fitzburgh, who joined Diamond

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tell all about aluminum wire

Get the full facts about United States Rubber Company's Aluminum Wires and Cables. These two clearly written, informative booklets are packed with data on specifications, standards, photographs showing stripping, joining, soldering—installation facts of all kinds, plus property tables. In addition, there is a table showing how "U. S." Aluminum wire's insulation properties compare with Underwriters' Laboratory Standards.

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Quality you can count on—FOR SAFETY... FOR SERVICE

Yes, safety and service are the two big reasons why Kleins are the choice of the man on the pole. Look for the familiar Klein trade-mark on pliers and climbers, safety straps and belts, lag wrenches and grips. It has been a trade-mark of quality "Since 1857."

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York

Write for your free copy of the Klein Pocket Tool Guide today!

"Since 1857"

Mathias KLEIN & Sons

Established 1857 — Chicago, U.S.A.

1200 BELMONT AVE., CHICAGO 18, ILL.

Power in 1929, has been serving as executive vice president since 1950. Prior to this he worked as chief engineer and later as assistant to the president.

Thomas has been with Diamond Power for 36 years, serving as president for 19 years.

CHARLES BOLTON

Connecticut Power Names Bolton a Vice President

Charles Bolton has been elected a vice president of Connecticut Power Co. He will continue as secretary-treasurer, a post he has held since 1946.

In his earlier career Bolton was a member of the accounting staff of Stone & Webster Engineering Corp, Boston, and also served with Tampa (Fla.) Electric Co as assistant chief clerk. He was then transferred to the Key West (Fla.) Electric Co as chief clerk. He joined Connecticut Power as an accountant in 1922. Later he was named assistant secretary and treasurer.

Jane Grau has been named home service director of Duquesne Light Co. Miss Grau succeeds Anne Sutter, who has retired after 17 years with the company. The new director joined Duquesne Light as a demonstrator in 1943. Miss Sutter became the director in 1936.

Henry B. Bryans, retired president of Philadelphia Electric Co. has been elected vice president and a member of the board of directors of United Engineers & Constructors, Inc, Philadelphia. Bryans, who was made presi-

Here's why JENKINS GOLD SEAL TAPE

GUARANTEED FOOTAGE — you get full measure in every roll.

NO WASTE — Gold Seal Friction Tape tears evenly, does not ravel, conforms closely to uneven surfaces. Selected base cloth is made to high strength specification.

HIGH DIELECTRIC STRENGTH — Less footage is needed per job with Gold Seal Tape. No pinholes . . . one thickness insulates.

LASTING "TACK" — adhesive compound is prepared under laboratory control; this means that Gold Seal will stick to the job under severe conditions of cold and moisture.

EASY HANDLING — Gold Seal does not peel, dry out or smear the hands in hottest weather.

CELLOPHANE-WRAPPED — Keeps Gold Seal Tape factory-fresh until you're ready to use it.

PACKAGED FOR CONVENIENCE — In single rolls or handy 10-roll containers, it's the best buy in tapes. Jenkins Bros., (Rubber Division), 100 Park Ave., New York 17, New York.

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Gold Seal Tape

FRICTION . . . RUBBER

MADE BY JENKINS BROS. . . . MAKERS OF FAMOUS JENKINS VALVES

Have you a fly ash recovery problem?

Bring it to
WESTERN PRECIPITATION

. . . The Only Organization With Years Of "Know-How" In BOTH *Electrical* And *Mechanical* Recovery Methods!

If you have any kind of a suspension-recovery problem—whether dust, fly ash, fume, fog or mists—it will pay you to bring it to the leading organization in the field . . . WESTERN PRECIPITATION CORPORATION. Western Precipitation not only pioneered, over 44 years ago, the first commercial application of the now-famous COTTRELL Electrical Precipitators, but also has been a leader for many years in the *mechanical* recovery field with its widely-accepted MULTICLONE Collectors.

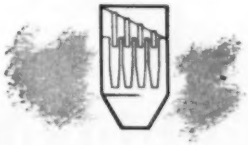
Result:

Western Precipitation is unsurpassed in the all-important factor of "know-how" in BOTH the electrical and mechanical fields . . . knows from years of first-hand experience whether your particular problem can best be solved by mechanical or electrical methods—*or by a combination of the two* . . . can give you a direct and unbiased recommendation on the matter . . . and then can provide the complete installation under *one* responsibility, *one* overall performance guarantee, even where Combination Multiclone-Precipitator (CMP) installations are made!

Western Precipitation products and services include . . .

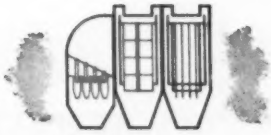
COTTRELL
Electrical Precipitators

. . . the most efficient recovery equipment for high recovery, long life, low maintenance on practically any type of suspensions, wet or dry. COTTRELLS can be designed to handle a few c.f.m. —or millions—with equal ease, and at virtually any operating temperature. Recovery efficiencies closely approach 100% recovery, if desired, with very low draft loss, minimum power costs and negligible labor costs. *By all standards, Western Precipitation* COTTRELLS *give highest recovery at lowest cost per-year-of-service!*



MULTICLONE
Mechanical Collectors

. . . the most efficient, most compact, most trouble-free mechanical equipment for recovering suspensions from gases. Because of their unique small-tube design, MULTICLONES are unsurpassed in mechanical recovery efficiencies—require less space, less maintenance, and are far simpler to install. No filters or screens to replace, nothing to burn or cause fire hazards, no high speed moving parts to repair or replace. These and many other advantages make MULTICLONE Collectors the logical choice on installations where mechanical recovery is selected.



CMP UNITS
(Combination Multiclone-Precipitator)

. . . combine, in *one* compact installation, *both* mechanical and electrical recovery principles so that maximum benefit is obtained from the advantages inherent in each method. The MULTICLONE section centrifugally removes the larger and heavier suspensions (down to a few microns in diameter) . . . and the COTTRELL section then electrically removes the very small particles remaining in the gases. Thus, the bulk of the recovery is obtained with relatively low-cost equipment, and the final clean-up is obtained with equipment having unusually high recovery efficiency—approaching theoretically perfect, if desired.

The recovery of suspensions from gases is a highly exact science and every problem is different. Some require mechanical methods—others electrical methods—still others a combination of mechanical and electrical methods in proper balance to meet the individual requirements of each application. No matter what your problem, remember that only Western Precipitation has had years of field experience in BOTH mechanical and electrical methods!

Send for descriptive literature!

Let our experienced engineers study your recovery requirements and make an unbiased recommendation on the equipment best suited to your particular problem. A wire, phone call or letter to our nearest office places this unique "know-how" at your service, without obligation.

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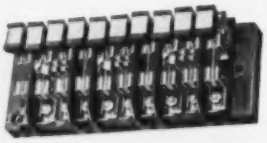

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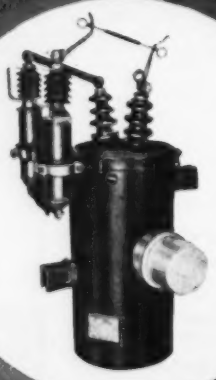

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dent of Philadelphia Electric in 1947, started his utility career in 1907.

C. H. Lanphier Elevated by Sangamo Electric Co

C. H. Lanphier, vice president of Sangamo Electric Co, Springfield, Ill., since 1946, has been appointed executive vice president. He was promoted

C. H. LANPHIER

to this newly created officer's post to facilitate his direction of engineering, sales, finances, production, and other overall administrative responsibilities.

Lanphier, who started with the company in 1931 in the engineering department, was elected a treasurer in 1943.

Detroit Edison Appoints Albright Vice President

Detroit Edison Co has announced the election of Arthur S. Albright as

A. S. ALBRIGHT

2-WAY RADIO SYSTEM TRIPLES EFFICIENCY OF MAINTENANCE TRUCKS

San Diego Gas & Electric Expansion Plans Will Put G-E Mobile Communication in More Service Vehicles

FAST-GROWING cities like San Diego, whose population has mushroomed 65% in 10 years, make heavy demands on utility equipment. Communications Supervisor L. J. Tank of the San Diego Gas & Electric Company describes his solution this way:

"At the present time 53 of our vehicles are equipped with G-E mobile radio. Our records show they are almost 3 times as efficient as our utility trucks that are not radio-equipped. Because these G-E units have paid off for us, our expansion plans call for more of the same."

We make a specialty of radio communication systems for utilities. The G-E Communications Man in your city is prepared to discuss General Electric's CAS* with you.

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★

Overhead trouble trucks are radio-equipped. Dependability, a prime G-E feature, is top requirement in radio for utilities.

Radio Speeds Work – Instant communication with transmission department permits line foreman Ed Howley to coordinate operations at several points. Few tubes, simple construction make G-E equipment easy to service.

Central office communication system is tied in to mobile net. In 5 years peak load of this utility has jumped from 177,000 kw to 305,500 kw. The company now serves 198,000 customers, is still expanding facilities.

Hill-climbing jeep carries 2-way radio. Operator talks from high ground to valley over FM frequency. Static-free signal is clear in any weather. G-E units are engineered to take rough abuse in bumpy terrain.

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DUXSEAL is a non-hardening adhesive plastic compound made with an asbestos base. It is the ideal general utility sealing and caulking compound for sealing duct openings, potheads, bushings, terminal boxes, and for filling multi-wire contact boxes indoors. Use it like putty, just as it comes from the handy package for smooth, workmanlike jobs. Every electrician should keep a package in his tool box for on-the-spot use.

Stays plastic—Duxseal stays plastic indefinitely. Will not slump, melt or run under ordinary temperatures.

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SEALING COMPOUNDS

vice president. The utility also appointed Everett E. Roll as an assistant secretary.

Albright will continue as treasurer, a position he has held since 1949. With Detroit Edison since 1912, he has served with the meter department, headed the research department, and from 1943 to 1949 was controller.

Roll, the new assistant secretary, came to Detroit Edison in 1928.

R. C. BECHERER

Robert Becherer Elected President of Link-Belt

Robert C. Becherer has been elected president of Link-Belt Co, Chicago, to succeed George P. Torrence, who is retiring.

Becherer, who joined Link-Belt in 1923, was elected vice president and executive vice president in 1951.

From 1911 to 1936, Torrence served Link-Belt, becoming vice president in 1928 and president in 1932. After an absence of ten years from the company, he returned to Link-Belt in 1946 to become executive vice president. He served in this post four months and was then made president.

Worthington Corp Makes Hood a Vice President

C. K. Hood, formerly manager of Worthington Corp's New York district sales office, has been elected to a vice presidency. This firm, until recently, was known as Worthington Pump & Machinery Corp.

Hood will be responsible for the direction of the activities of the Public Works, Steam Power, Deaerating,

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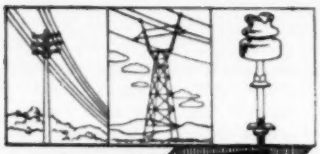

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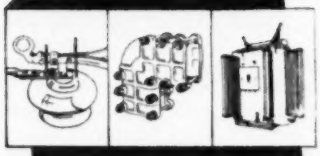

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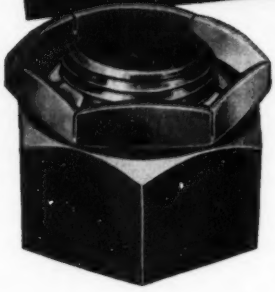
TRADEMARK
LOCK NUTS



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Water Treating, and Steam Turbine Divisions and will report direct to T. Cruthers, vice president.

He started his career with Worthington in 1918 and has been manager of the New York office since 1930.

J. C. Washington, formerly manager of the Albany (N. Y.) office of Line Material Co, has been appointed sales manager of Inet, Inc, Los Angeles, manufacturer of direct current power supplies and controls.

R. B. Sayre has been appointed assistant vice president of Graybar Electric Co. Sayre, who joined Graybar in 1921, has been district manager at Jacksonville, Fla., since 1948.

OBITUARY

Forrest Nagler, 66, who retired March 1 as manager and chief engineer of Allis-Chalmers Manufacturing Co's atomic power section, died April 1 at Lake Forest, Ill. Nagler, who held many patents in the hydraulic turbine field, came to A-C in 1906. In 1929 he left A-C to join A. O. Smith, Milwaukee, remaining until 1932. In 1933 he joined Canadian Allis-Chalmers, Ltd, Toronto, Ont. He returned to A-C in Milwaukee in 1942, assuming the atomic power section post in 1949.

Douglas C. Stewart, 54, safety supervisor for Niagara Mohawk Power Corp, died April 5 at Buffalo, N. Y. Stewart, who started with the utility in 1922 as a draftsman, was appointed safety supervisor in 1941.

Lawrence E. Thorne, 56, Port Arthur, Tex., divisional manager for Gulf States Utilities Co, Beaumont, Tex., died March 29 at Port Arthur.

Hampton J. Dailey, 46, an electrical engineer with the Lamp Division of Westinghouse Electric Corp at Bloomfield, N. J., died April 3 at Verona, N. J.

Raymond J. McVeigh, 45, assistant counsel to the New York State Public Service Commission, died April 6. He joined the commission in 1934.

John V. Painter, 82, retired secretary of Appleton Electric Co, Chicago, died there recently.

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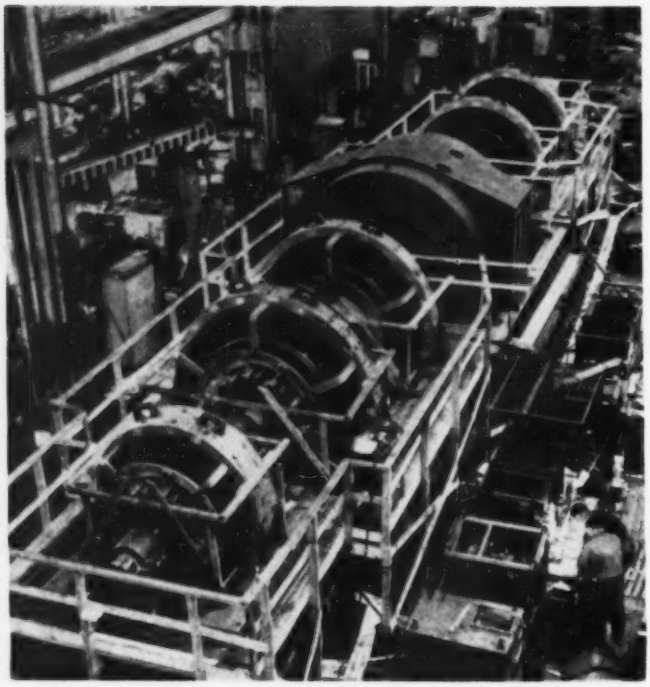

GE's Longest Motor-Generator Set

Longest ever built by the General Electric Co, this giant motor-generator set is shown on test at the company's large Motor and Generator Department, Schenectady, N. Y. The lengthy M-G set, ordered by the United States Steel Co for its new Fairless Works near Morrisville, Pa., measures 66 ft, 8 in. overall and weighs 411,850 lb. It is part of a multimillion dollar order for electrical equipment placed by the steel firm with GE. The set, which is rated at 10,800 kw and driven by a 15,000-hp synchronous motor, will supply dc power for a four-stand cold strip mill. When installed the unit will have covers for forced ventilation.

End of Copper Shortage in Sight, NPA Chief Says

Because of an increased flow of copper and brass scrap, a "slight easing" has taken place in the nation's copper supply. As a result, the end of the nation's severe copper shortage may be in sight. This information was revealed recently by Paul Andrews, chief of the Copper Division of the National Production Authority.

Barring an unexpected change in the international situation, Andrews said the current easing in copper supply "could mark the end of the copper shortage."

Until now, copper has been the tightest of the three metals covered by the Controlled Materials Plan. Steel and aluminum already have eased to the point where government mobilizers are planning to decontrol them, bit by bit.

According to Andrews, two factors are chiefly responsible for the improved copper outlook. These are: A steady climb in offering of copper and brass by dealers due to softening that has occurred in foreign prices. Andrews said dealers anticipate a similar softening in domestic prices. And increased return of scrap by the military, particularly scrap arising from the manufacture of ammunition and other military items.

Despite the brightened outlook, Andrews, however, would give no estimate of the percentage increase in second quarter supply over the first quarter supply.

Sylvania's 1951 Sales Set Record, Income Up

Sylvania Electric Products, Inc, has reported that last year's sales established a record and net income reached an all-time high despite an increase of 63% in federal income taxes.

Net sales, which passed the $200 million mark for the first time, reached $202,806,387, an increase of 25% or more than $40 million over the $162,514,814 of 1950.

Net income for 1951 amounted to $8,253,973, compared with $8,221,-185 in 1950. The total was equal to $4.18 per share of common stock on 1,856,550 shares outstanding against $5.37 a share on 1,456,550 shares outstanding in 1950.

While the increase in net income after taxes was small, income before taxes was $26,153,973, or 36% greater than the 1950 income before taxes of $19,221,185. Provision for taxes in 1951 totaled $17.9 million against $11 million a year earlier.

Sales last year were well ahead of 1950 in every division except one. Television picture tube sales were below those of 1950, reflecting a drop in demand by many television set manufacturers.

Assets increased to $150,968,617 on Dec. 31, 1951, from $92,880,534 at the 1950 year-end. Inventories increased by $26,506,515 and net permanent property by $11,511,042. Current assets were 2.6 times current liabilities.

Ultrasonic Corp Buys Monitor Controller Co

Monitor Controller Co, Braintree, Mass., has been purchased by Ultrasonic Corp, Cambridge, Mass.

Established in 1888, Monitor is a manufacturer and distributor of motor control and switchgear equipment for industrial use. Ultrasonic will use

Monitor's production facilities for the manufacture of certain of its sonic and electronic computer equipment in addition to the continued manufacture of Monitor's products.

Monitor has about 400 employees and Ultrasonic about 100.

Kaiser to Expand Tacoma Plant, Raises Output Goal

Kaiser Aluminum & Chemical Corp has raised its primary aluminum production goal beyond the 800 million lb a year mark by authorizing immediate construction of additional facilities at its Tacoma, Wash., reduction plant.

The construction, scheduled for completion this summer, will include plant modifications to increase production efficiency and additions to rectifier equipment permitting utilization of more electric power. Bonneville Power Administration will supply the additional power necessary on an interruptible basis.

The Tacoma plant's current output will be increased by 33% from an annual capacity of 50 million lb to 66.4 million lb per year. This increase and new capacities at Kaiser Aluminum's other primary aluminum plants at Spokane, Wash., and New Orleans, La., will boost the company's overall capacity 137% over last year's production.

MANUFACTURING BRIEFS

Moloney Electric Co, St. Louis, which was underbid several hundred thousand dollars by an English firm, has been awarded a $1,432,461 contract by the Army Corps of Engineers for furnishing nine 56,500-kva transformers for McNary Dam on the Columbia River near Umatilla, Ore. The low bid of Ferranti Electric Co, Lancashire, England, "did not meet specifications," according to Col W. H. Mills, Walla Walla district engineer for the corps.

Worthington Corp is the new name of Worthington Pump & Machinery Corp, Harrison, N. J., which manufactures pumps, steam power generation apparatus, generators, and switchgear. No corporation policies or practices will be affected in any way by the name change.

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A POLE HOLE DIGGER . . . Uses your regular derrick and crew. Attaches by a single bolt to power take-off shaft. Adjustable for clean holes up to 10 feet deep. Interchangeable augers 8 to 20 inches diameter.

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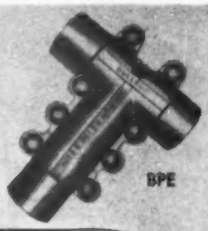

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All series of connectors also available with hex head bolts.

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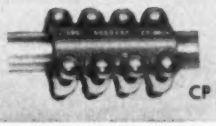

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UTILITIES

Proposed Construction

Arizona—Navopache Electric Cooperative, Lakeside, 22 mi. rural distr. line and sys. imprvs., Navajo Co. $310,000.

California—Bureau Reclamation, Dpt. Interior, Bldg. 1A, Denver Federal Center, Denver, Colo., one sub-station for Folsom Power Plant, American River Division, Central Valley Proj. Spec. DS 3702. L. M. McClellan, Bldg. 1A, Denver Federal Center, Denver, Colo., ch. engr.

Conn., Bloomfield — Kaman Aircraft Corp., Bradley Field, Windsor Locks, plans by W. Stewart Thompson & Phelps Barnum, 250 Park Ave., New York, N. Y., boiler plant, maintenance shop and garage.

Delaware—Delaware Rural Electric Assoc., Greenwood, rural distr. lines and sub-station. $1,100,000. R. R. Jefferson, c/o owner, engr.

Kentucky—U. S. Eng., 830 W. Broadway, Louisville, Zone 3, 11 storm water water pumps and motors, 3 switchgear units, 9 power transformers (6,075 kva. total), two 12 and 8 ft. flap gates, 3 overhead traveling cranes and trolley hoist, 1 gantry crane and trash rake and trash car for pumping plants, Mill Creek, Lee's Lane and Paddy's Run, Louisville. CIVENG 15-029-52-98.

Me., Brunswick—Dist. P. Wks. Office, First Naval Dist., 495 Summer St., Boston, Mass., control tower and operations bldg., U. S. Naval Air Station, NOY 29601, Spec. 31255. Plans deposit $60.

Mass., Danvers—Town, Robt. E. Layton, mgr., Town Hall, installation approx. 9,000 ft. underground cable, transformer station, sub-station, appurtenances, $100,000.

Mo., St. Louis—Commerce, Civil Aeronautics Admin., Procurement Branch, City Hall, Kansas City, precision approach radar sys., incl. frame bldg., cable, transformer, etc., Lambert-St. Louis Municipal Airport, Proposal SP 52-69.

Mich., Sault Ste Marie—U. S. Eng., 1900 Cadillac Tower, Detroit, stabilize and demolish old U. S. Hydroeleteric Power Plant, St. Marys Falls Canal, Eng. 20-064-52-49.

N. Y., New York—Dpt. Correction, 100 Centre St., Zone 13, furnishing, installing 2 new metal enclosed 400-ampere, 2,300-volt switch gears to be connected to existing two switch gears in the transformer vault in basement of Mess Hall Bldg., New York City Reformatory, New Hampton, Orange Co.

Oklahoma—Northeast Oklahoma Electric Co-operative, Vinita, 257 mi. electric distr. line and sys. imprvs., Craig Co. $992,000.

Texas—Rio Grande Electric Co-operative, Bracketville, 50 mi. rural distr. lines; 75 mi. transmission lines, related sub-station, Kinney Co. $520,000.

Texas—Eastex Telephone Co-operative, Henderson rural pole telephone lines, Rusk Co. $275,000.

Tex., Wichita Falls—U. S. Eng., Box 61, Tulsa 2, Okla., power supply to maintenance and operations facilities, Inv. ENG 34-006-52-57. $250,000.

Utah—Emery County Farmers Union Telephone Assoc., Emery, 175 mi. telephone lines, Emery, Emery Co. $75,000. Jackson & Jackson, 19 W. South Temple St., Salt Lake City, engrs.

Washington—Bonneville Power Admin., P. O. Box 3537, Portland, Ore., transmission line, Chief Joseph Dam to Snohomish, $6,955,000; addns. to Spokane to Deer Park sub-stations, $3,649,000; addns. to Wenatchee aluminum plant sub-stations, $3,699,000; Okanogan & Ferry Co. transmission lines, $1,829,000; expending Longview sub-station, $252,000.

Alta., Edmonton—Province of Alberta, Edmonton, power plant at Legislative

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SIMPLEX REEL JACKS

- Stable, T-Shaped Base
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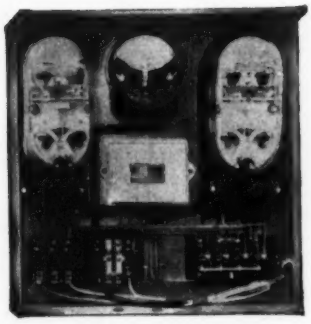

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Alta., Oliver—Province of Alberta, Edmonton, power plant at Provincial Mental Institute, $110,000 voted Dpt. P. Wks., Edmonton, engr.

Low Bidders & Contracts Awarded

Ia., Cedar Falls—John G. Miller Constr. Co., Waterloo, Ia., Lib, $108,100 power plant addn. City, Cedar Falls, Ia. Bids Mar. 17.

Okla., Sulphur—Oklahoma Gas & Electric Co., 321 N. Harvey St., Oklahoma City, Okla. Owner Bulds. $8,500,000. 100,000-kw steam power plant, near here. Pioneer Service & Engineering Co., 231 S. LaSalle St., Chicago, Ill., engrs.

Pa., New Cumberland—Howard P. Foley, 21 and Revere Sts., Harrisburg, Pa., CA, $74,940, rehabilitation of electrical distri. system supplying Warehouses Nos. 1-10 inclusive, underground services to officers quarters Bldg. Nos. 38, 40 and 41. Contg. Section, New Cumberland General Depot, New Cumberland, Pa.

Tex., Houston—L. W. Donnelly, 3710 Garnet St., Houston, Tex., CA. Approx. $400,000. Sub-station.

Tex., Stanton—West Texas Telephone Co-operative, Stanton, Tex. Purchase and Hire. $150,000. Constr. portion of program for pole rural telephone lines.

Tex., Texas City—Republic Oil Refining Co., Texas City, Tex., Own Forces. $425,000. Power unit.

Texas—Rusk-Panola Electric Assn., Carthage, Tex. Purchase and Hire. $100,000. Reconstr. electric power lines, Henderson.

Va., Alexandria—Stone & Webster Eng. Corp., 3300 Benning Rd. N.E., Wash., D. C., CA $16,000,000, design and construct power plant addition of 80,000 KW units. Potomac Electric Power Co., 10 and E Sts. N.W., Wash. D. C.

Wash., Seattle—Todd Shipyards Corp., 1801 16 Ave. S. W., Seattle, Wash., CA $87,000, steel tube linings for turbine outlets in Ross Dam Powerhouse. City, County-City Bldg., Seattle, 4, Wash.

Ont., Centralia—Hydro-Electric Power Comm. of Ontario, University Ave., Toronto, Ont., CA, $73,500, electrical distr. system at R.C.A.F. Station. Defence Constr. Ltd., 441 Queen's Quay W., Toronto, 2B, Ont. R. P. Ople, c/o owner, engr.

Ont., Hamilton—Tope Constr. Co., Ltd., 677 Main St. W., Hamilton, Ont., CA, $70,000, electrical sub-station for part of steel plant expansion. Steel Co. of Canada Ltd., Wilcox St., Hamilton, Ont. Alex Leischman, c/o owner, ch. engr. Awarded Apr. 3.

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Ill., Joliet—U. S. Eng., 320 Merchandise Mart, Chicago 54, Ill., Joliet Ordnance Plant modification, $5,000,000. United States Rubber Co., will operate.

Ind., La Porte—La Porte Cargo Tractor Div., Allis Chalmers Co., W. A. Roberts, pres., 2 story, 555x75x225 triangular shape brick, rein.-con. manufacturing and storage bldg., along C & O Ry. $3,000,000.

Ky., Owensboro—Wesleyan College, Owensboro, plans by Poundstone, Ayers & Godwin, Boan Allen Bldg., Atlanta, Ga., Roberts & Marshall, and Max Bisson, Owensboro, combination classroom and admin. bldg., student union bldg. and 2 dormitories. $1,000,000.

La., New Orleans—Delta Gas Corp., c/o Wyatt C. Hedrick, archt. and engr. 5201 Fannin St., Houston, Tex., chemical plant, $7,500,000.

Mass., Boston—Massachusetts General Hospital, Fruit St., plans by Coolidge, Shepley, Bulfinch & Abbott, 1 Court St., child psychiatry unit; medical offices for staff doctors; house officers quarters; laundry and mail shop; renovation of out patient dpt. $7,500,000.

N. J., Kenilworth—Owner, c/o Vincent Kling, archt., 917 Corinthian Ave., Phila., Pa., storage warehouse and railroad siding. $5,000,000.

Va., Norfolk—Fifth Naval Dist., Naval Station, Zone 11, Naval Hospital, near here. Site not selected. $16,000,000.

Alta., South Edmonton—W. C. Woodward Stores Ltd., Edmonton, 2 story, 100,000 sq. ft. concrete, structural steel department store, $3,000,000.

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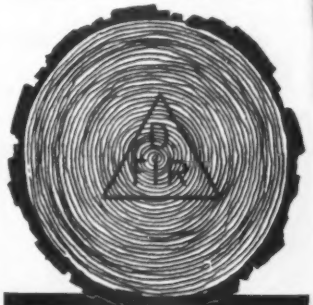

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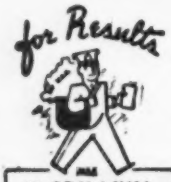

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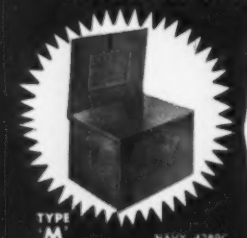

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BOOK REVIEWS

Capacitors

Capacitors For Industry. **By W. C. Bloomquist, C. R. Craig, R. M. Partington and R. C. Wilson. Published by John Wiley & Sons, Inc, New York 16. 246 pages, illustrated. Price $4.50**

Practical application data is presented and information given in tabular and curve form. Examples are included with step-by-step procedure for solution of practical problems. For the industrial plant engineer and electrician, utility power salesman, consulting engineer and industrial power application engineer to guide them in the selection, application and economics of capacitors in industrial plants.

Heating

Induction Heating. **By H. R. Stansel. Published by McGraw-Hill Book Co, New York 36. 212 pages, illustrated. Price $3.50**

This presents the electrical and thermal principles of use of eddy currents for heating service and shows how they are applied in practice. Measurements are included to give a factual basis for the work. Curves accompany almost all equations to show visually the consequences of varying its parameter. Examples and illustrations cover entire range of practice in heating and melting metals. Of practical value to engineers in providing new techniques in using heat in manufacturing.

Radio

How to Pass Radio License Examinations. **By Charles E. Drew. Published by John Wiley & Sons, Inc. New York 16. 367 pages, illustrated. Price $4.50**

This is a third edition. The second edition was published in 1944. Although not a textbook, it contains all essential information needed to pass F.C.C. examinations for any type of radio operator license or permit (excluding aircraft radiotelegraph and ship radar techniques license endorsements). The question and answer style assists reader in determining whether he has sufficient knowledge of the field. A reference bibliography is included.

Magnetics

Electromagnetics. **By R. M. Whitmer. Published by Prentice-Hall, Inc, New York 11. 270 pages, illustrated. Price $6.65.**

This is a textbook devoted to the application of the field-theory as taught at Rensselaer. Treatment is mathematical and vectorial throughout for both electrostatic and magnetic aspects. The latter third deals largely with waves and waveguides.

Appliance Repairs

Everyday Household Appliance Repairs. **By William H. Crouse. Published by McGraw-Hill Book Company, Inc, New York 36, N. Y. 295 pages, illustrated. Price $4.95.**

"It is recommended that if you suspect trouble, you call in a qualified serviceman and have him . . . check it." Thus the author advises the reader on refrigerator repairs. Should this have been his suggestion covering all appliances, the book would be of more value to the layman. Even to the experienced repairman there is little here that would aid him in repairing appliances with which he might not be familiar.

The book does provide simple explanations of the electric circuit, house wiring, and safety precautions. The uninitiated and mystified household repairman will derive much helpful information and will at least learn some fundamentals.

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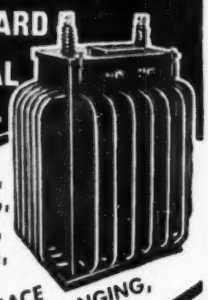

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● METER SOCKET SELECTOR: An 18-page booklet, called the "Meter Socket Selector" B-5284, presents information on selecting the proper meter socket. Data on type of service desired and wire size to be used is all that is needed to select proper meter socket. Information on circuit closing provision, terminals, service disconnects, etc is included. Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

● FLUORESCENT MERCURY LAMPS: Complete detailed information on the Westinghouse JH-1 fluorescent mercury lamps is now available in a new 4-page booklet. Complete physical descriptions plus recommended applications are presented. Tables of technical and transformer data are presented. For A-6007, write Westinghouse Electric Corp, Lamp Div, Bloomfield, N. J.

● FIRE FIGHTING PRODUCTS: This 12-page catalog describes the complete line of fire fighting products available to industrial plants, refineries, oil transport companies, and municipal fire fighting departments. Equipment can be used to combat highly volatile flammable liquids and ordinary combustibles. Rockwood Sprinkler Co, 38 Harlow St, Worcester 5, Mass.

● GEARS: Gears, speed reducers, flexible couplings and limi-torque valve controls are described in a 4-page bulletin entitled "Power Thrifty Products by Phillie Gear." Types and size ranges are included. Write Philadelphia Gear Works, Inc, Erie Ave and G St, Philadelphia 34, Pa.

● FUSES: A quick reference folder, Series FLB 300-C describes Trico electrical and lubricating products. Folder tells of merits of powder-packed renewable, one-time and plug fuses, fuse pullers, clamps for fuse clips, test clamps and lubricating devices. Trico Fuse Mfg. Co, 2948 No. 5th St, Milwaukee 12, Wisc.

● WATTHOUR METERS: "10 Ways I-50 Meters Reduce Operating Expenses," a 16-page bulletin, has just been published by GE. Designated as Bulletin GEA-5727, the publication outlines possible savings that can be realized by electric utilities through use of factory-certified GE I-50 watthour meters. Write General Electric Co, Schenectady 5, N. Y.

● MERCURY RELAYS: Catalog 17 describes the non-tilting mercury plunger relays. Advantages of these relays, application data and other information on relays is included. H-B Instrument Co, 2633 Trenton Ave, Philadelphia 25, Pa.

● ELECTRICAL INSULATION: A 24-page bulletin, No. 499, on Inmanco electrical insulation products has been released recently. The booklet contains sections on fabricated electrical insulation parts, styliized motor slot insulators, fibre washer assortment, hand maple wood wedges and formed fibre wedges. Insulation Manufacturer Corp, Chicago 6, Ill.

● SIGNAL EQUIPMENT: Bulletin USE-1, 32 page, two color publication covering a complete line of signal equipment including various new items is being distributed by Cannon Electric Co. It is adaptable in both hospital and commercial installation. It includes descriptions of such equipment as visual annunciators, code relays, fire alarm stations, grounding intercouplers and in-and-out registers. Available upon request to Cannon Electric Advertising Dept, P O Box 75, Los Angeles, Calif.

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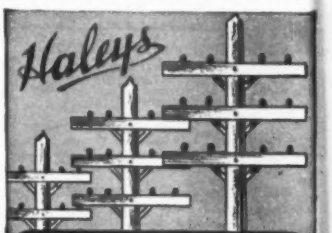

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TECHNICAL LITERATURE

Transmission and Control—A new 6-page illustrated data release titled *Electronic Transmission and Control* was announced by the Swartwout Co, 18511 Euclid Ave, Cleveland 12, Ohio. Copies of the Data Release A-703 are available upon request.

ASTM Standards—Year end action by the administrative committee on standards, American Society for Testing Materials resulted in a number of new standard specifications and some important revisions. Copies can be procured from ASTM Headquarters, 1916 Race St, Philadelphia, Pa at 25 cents per copy.

Gas Scrubber—A capacity curve sheet, cross section diagram and electrical data including typical installation pictures is contained in a new two color bulletin 203-B. Available upon direct request to the manufacturer, Peabody Engineering Corp, 580 Fifth Ave, New York 19, N. Y.

AIEE Standards—The following standards have been published by AIEE: No. 27, *Switchgear Assemblies and Metal Enclosed Bus*; No. 45, *Recommended Practice for Electrical Installations on Shipboard*, and Y32.1.1—*Graphical Symbols for Single (one) Line Elec Engineering Diagrams*. Copies may be obtained at a nominal charge from American Institute of Electrical Engineers, 33 West 39 St, New York 18, N. Y.

Electrical Power Survey—EEI Publ 51-17 priced at 50 cents, may be obtained from the Edison Electric Institute, 420 Lexington Ave, New York 17, N. Y. It is the tenth semi-annual survey of the EEI in cooperation with power area representatives of electric power systems and manufacturers of heavy electric power equipment. It features capability, peak loads, gross margin manufacturing schedules and procurement.

Flashbulb Circuits—Two economical dry-battery circuits for operating repeating electronic flashtubes for photography are described by D. A. Marshall and N. M. Porter. March issue of Photographic Science and Technique published by the Photographic Society of America. Reprints are available from the National Carbon Co, Battery Engr Dept, 30 East 42 St, New York 17, N. Y.

Amplifier System—Instrumentation Data Sheet 10.20-4 describes and illustrates the new Brown high gain servo amplifier system. Amplification, operation and special design considerations of the new amplifier are discussed. Photographic and schematic illustrations are included. Write Minneapolis-Honeywell Regulator Co, Brown Instruments Div, Station 40, Wayne and Windrim Aves, Philadelphia, Pa.

Stainless Steel—A new 31-page bulletin ADV 19014 describing the use of U.S.S. 12 and U.S.S. 17 stainless steel for the walls and roofing of industrial buildings has been released by the United States Steel Corp, Pittsburgh, Pa.

Turbines and Condensers—Publication 51-5 released by EEI contains statements by operating companies and manufacturers on turbines, condensers and auxiliaries, feed-water heaters, evaporators and deaerators. The booklet which also includes sections on turbine operating and outage data and simultaneous unscheduled outages of major plant equipment can be obtained from Edison Electric Institute, 420 Lexington Ave, New York 17, N. Y.

X-Ray Diffraction and Spectrometer Catalogue—A 60 page bulletin, *X-Ray Diffraction and Geiger-Counter X-Ray Spectrometric Equipment* has been released by Research and Control Instruments Division, North American Philips Co Inc, 750 So. Fulton Ave, Mt Vernon, N. Y.

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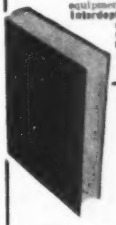

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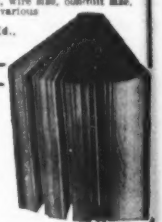

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LOCATION - CHICAGO

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CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

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U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-3703) will be received at Denver, Colorado, until May 13, 1952, for furnishing one 12,500/16,667-kva, 4,000 delta- to 115,000 grounded wye-volt, 3-phase, 60-cycle, class OA/FA, outdoor power transformer with three tank-mounted lightning arresters for Nimbus Switchyard, Central Valley Project, California. Delivery is desired within 780 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver, Colorado.

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AGE: 30-45.

Salary commensurate with qualifications

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500	*G.E.	FBG	1800
450	G.E.	KF-5678	1200
400	*Cont. (New)	NZ	1800
400	*G.E.	IK	514
350	*Cr.-Wh.	SC	3600
300	G.E.	IE-K	1200
300	Al.-Ch.	AR	900
300	*Westg.	CS	3600

1000 KW MOTOR-GENERATOR SET 3-UNIT
2—500 KW Westgh. DC Gens. 275/137.5, 3 wire, 1820 Amps. D/C to
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*H.P.	Make	Type	P.F.	Speed
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700	G.E.	T8	1.0	514
320	*Al. Ch.	Dr. Pf.	1.0	720
300	Cr.-Wh.	Eng.	1.0	300
250	*Al. Ch.	Dr. Pf.	.8	720
150	*Westg.		1.0	300
135	El. Machy.	Syn.	1.0	900
125	Cr.-Wh.	100-S	1.0	900
115	E.-M.	KM	1.0	240
100	Cr.-Wh.	100-S	.8	900

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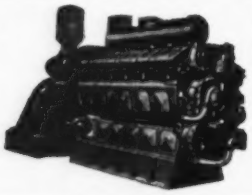

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1420	Fairbanks Morse	38D8½	1800	720	330	Superior	KSA	500	514
1200	General Motors	16-278A	1600	720	312	General Motors	8-268A	450	1200
937.5	General Motors	12-567	1060	720	312	Clark	MD-4	375	327
625	Alco	6-12½x12T	750	600	125	Ingersoll Rand	S	225	514
435	Baldwin	VO-6	510	450	187	General Motors	3-268A	150	1200
400	Buckeye	80	480	600	75	General Motors	6043C	90	1200

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1—75 KW C.W. 250V, 1200 RPM, 2300/3150V Syn.

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DC—80 KW—100/300V-600/1800 RPM. Cummings. Model-HGD
60 KW—120V-1200 RPM. Buda. Model-6DCG
60 KW—120V-1200 RPM. Cummings. Model-HGD

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222 HP—230V-3050 RPM. Westinghouse

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1000 KVA—Volts 14000/2945/223. G-E & Westinghouse

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2000 CFM. 3 stages. Driven by 450 HP Clark Bros. Diesel

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1—Air Pump. Ingersoll Rand. Type PS-548. 6690 CFM. Discharge pressure 20.86 ABS. Intake pressure 17.10 ABS with 150 HP. motor 3/60/2300.
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1—Blower. Roots Connersville. Size 20 x 45.
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10—15000# pull at 78 FPM, 3360# pull at 348 FPM and 2 Auxiliary Drums driven by Chrysler 28.35 HP gasoline engines (New).

WIRE ROPE SLINGS
Dia. from ⅝" to 3½", length from 10 ft. to 150 ft.

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For 6000 HP G-E motors
1500 HP Westinghouse motors
1200 KW Allis-Chalmers generators

CONDENSERS—MOST ARE NEW

No.	Sq. Ft.	Make	Passes	Tubes
2	6000	CH Wheeler	2	Brass ⅝"
1	3300	Str. Wells	2	Alum. Brass ¾"
1	1050	Conesco	2	CU. NI. ⅝"
15	400	Allis-Chalm.	2	Brass ⅝"
5	135	Conesco	2	Brass ¾"

AIR EJECTORS
1—Foster Wheeler. DE 51 Class for 1800 Sq. Ft. condenser. (New).
1—C. H. Wheeler. 4H240

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Also Lube Oil. Size 10-54.

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9000 CFM—3" S.P. 3/60/440, Buffalo.
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TEL. 5-6349

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TRANSFORMERS

Qu.	KVA	MFR.	VOLTAGE
3	3333	West.	132000—7620/13200 Y
3	1000	Wag.	69000—7200/12470 Y
2	75	A. C.	69000/24000—7200/12470 Y
4	2500	West.	44000—11000
3	150	G. E.	44000—7200/12470 Y
3	100	G. E.	44000—2300
3	75	West.	44000—7200/12470 Y
3	8333	West.	43800—13800
1	18750	A.B.B.	34840—11000, 3 ph.
3	100	West.	33000—240/480 NEW
3	100	A. C.	33000—7200/12470 Y
3	75	Wag.	33000—7200/12470 Y
3	50	Kuhl	33000—7200/12470 Y
4	450	A. C.	25410/44000—13280/23000
6	100	G. E.	22000—7200/12470 Y
9	50	G. E.	22000—2300
3	37½	G. E.	22000—6900
6	200	G. E.	13200—2300
4	333	Wag.	7200/12450 Y—2300
2	100	West.	7200/12470 Y—2400
6	25	Mol.	7200/12470 Y—120/240
3	500	Pitts.	6900/11900—550
3	333	Pitts.	6900/11900—550
3	150	Wag.	6900—2300
3	200	G. E.	6900/11430—575
3	37½	G. E.	6900—230/460
2	150	West.	4800/8315 Y—480
3	333	G. E.	2300—230/460
1	100	G. E.	2300—575, 3 ph.
3	100	West.	2300—460/230
3	75	Mol.	2400—120/240
6	50	West.	2400—114/228 DRY TYPE

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1—140 KVA G. E. 200 A. 4000 V. 3 ph.
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1— 600 A. 74 KV G. E. FHKO-236-500 MVA
1— 600 A. 37 KV G. E. FHKO-236-500 MVA
1—1200 A. 15 KV G. E. FKO-139-750 MVA
1— 600 A. 15 KV G. E. FKO-139-350 MVA
2— 600 A. 15 KV G. E. FHKO-136-1328 BS
4— 600 A. 15 KV G. E. FHKO-139-750 MVA
2— 600 A. 15 KV G. E. FLO-15-240 MVA

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1	750	G.E.	Condensing — 425 lbs. 750 TT I.S.P. 440 v. 3 ph. 60 cy.— Built 1944
1	500	Moore	Non-condensing, 150/200 lbs I.S.P. & 85 lbs. O.B.P. 3, 60/480 volts Direct Connected Exciter
1	400	Westz.	Non-condensing — 125/150 lbs. I.S.P. & 10 lbs. B.P. — 240/480 v. 3 ph. 60 cy.
1	300	G.E.	Non-condensing 150/175 I.S.P. & 10 B.P.—480 v 3 ph. 60 cy

SYNCHRONOUS CONDENSERS

KVA	Make	Type	Volts	Speed
1—5000	Whse		2400 4150	600

MOTOR GENERATOR SETS
3 ph. 60 cy.

Qu.	KW	Make	Speed	DC Volts	AC Volts
2	2000	G.E.	900	595 25 cy	11000
1	1500	G.E.	720	600	13200
1	1500	G.E.	360	275	2300/4600
1	1000	G.E.	900	300	4160/6900
1	1000	G.E.	600	600	2300/4160
2	1000	Whse.	900	600	2300/4150
1	800	Whse.	900	250	6600/13200
1	800	Whse.	1200	125/250	2300
1	800	Whse.	900	250	440
1	500	G.E.	720	125	2300
1	500	G.E.	720	250	440/2300
1	350	G.E.	900	125	4150
1	150	G.E.	1200	275	2300
1	150	Whse.	1200	275	2300

TRANSFORMERS—60 Cycle

KVA	Make	Type	Ph	Voltages
3—1065	G.E.	OISC	3	22860/13200x2300
1—1250	Whse.	OISC	3	13200x525
3—1250	G.E.	HVDDJ	1	6900x550
3—1000	Pitts	OISC	1	23000x13200/2200
3—1000	G.E.	HVDDJ	1	2300x480
3— 500	A.C.	OISC	1	13200/2300

BELYEA COMPANY, INC.
OFFICE & SHOP
51 Howell St., Jersey City 6, N. J.

—TRANSFORMERS—

BOUGHT AND SOLD

We carry a large stock of transformers, and invite your inquiries. New Transformers built to your specifications.

PIONEER TRANSFORMER REBUILDERS

We rewind, repair and redesign all makes and sizes. One Year Guarantee.

THE ELECTRIC SERVICE CO., INC.
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
SINCE 1912 CINCINNATI 27, OHIO

LETTERS TO THE EDITOR

STILL CLIMBING on Feb. 26 was Clyde Kiser (left) who began in 1900. His companion, Del Landman, has been climbing since 1912

A Climbing Record

To the Editor:

I wonder if anyone can top the 92 years of climbing experience shared by two linemen on our system. Clyde Kiser climbed his first pole for the Troy Ohio Telephone Co on Feb. 26, 1900. In 1936 he began climbing for what is now Pioneer Rural Electric Cooperative.

Delbert Landman started his lineman's career on April 3, 1912, with Columbus & Southern Light & Power Co. He joined Pioneer in 1940.

I don't think such a record can be compiled again because of limitations on working age. In addition, most linemen's legs don't hold up that long. Clyde Kiser says most linemen don't climb properly. I have worked with him when day after day he climbed 20 poles every day and thought nothing of it.

Harold Darst
Assistant Manager
Pioneer Rural Electric Co-op, Inc.
Box 604
Piqua, Ohio

• Who can top this one?

Adds to the List

To the Editor:

I was sorry to hear of the death of Ralph D. Mershon. His accomplishments, as set forth in the March 3 issue of Electrical World, were well known to many young engineers of the generation succeeding him.

The record fails to mention the invention of the electrolytic condenser, which is used in practically every radio and television set. It was always my impression that he invented this device . . . If I am correct in this belief, I think it might be well to add it to his other outstanding deeds.

R. H. Barclay
The J. G. White Engineering Corp
80 Broad Street
New York 4, N. Y.

• Reader Barclay's impression is correct and is verified by "American Men of Science," page 1690.

U. S. Industry Failed

To the Editor:

Your Technical Note in Electrical World, March 17, page 6, about scientists and engineers being "sad politicians" just came to my attention. As one of a small group who gave unlimited time for several years to keep the Science Foundation alive and sell it to Congress, I know that scientists can do a good job politically.

However, the parties who will benefit most from the Science Foundation now are the great industrial concerns. The Science Foundation will furnish them, at Government cost, with a steady and substantial supply of basic scientific research results and research scientists. They missed in not helping the Foundation get a workable budget.

Anything you can do in Electrical World to set this picture straight will be a boon to scientists, the Science Foundation, and U. S. industry.

Hyman Olken
1446 Tuckerman St., N.W.
Washington 11, D. C

New U. S. Policy

To the Editor:

Your editorial in the February 25 issue, "We Need a New U.S. Policy," has the effrontery to ask for a higher duty on large electrical equipment from foreign manufacturers. Not only is this desire for government help strangely inconsistent with your general policy of government "hands off" but also it shows a general lack of understanding of our world position.

By insisting on a favorable balance of trade we are consuming our own natural resources at a fast rate and are having to offset the dollar deficit in other countries by our foreign aid grants. All this at double cost to the taxpayer.

Is is necessary that we should turn to the government for help in times of full production?

Chas H. Monnig
R.R. 14 Box 435C
Cincinnati 11, Ohio

Old Errors Never Die

To the Editor:

We are very much interested in the installation of 6-v, 500-w gasoline-driven, dc generators as shown on page 150 of Electrical World, May 21, 1951.

Upon requesting information from [the indicated source], Detroit Edison Co, it was learned that they . . . had no such installations. If the information is available, I would be pleased to learn the name of the company which operates the equipment.

F. Van Whitten
Assistant Supt
Transportation Dept
Consolidated Gas Electric
Light & Power Co
Baltimore, Md

• This truck-mounted generator is used on the system of Toledo Edison Co, not Detroit Edison Co as indicated—sorry.

Likes Sales Articles

To the Editor:

You really "hit the jack pot" in your March 24th issue of Electrical World. You are to be complimented for the vast information furnished concerning merchandising policies of various utilities throughout the United States, especially since there has been many misconceptions as to the percentage of companies which are actually doing direct merchandising.

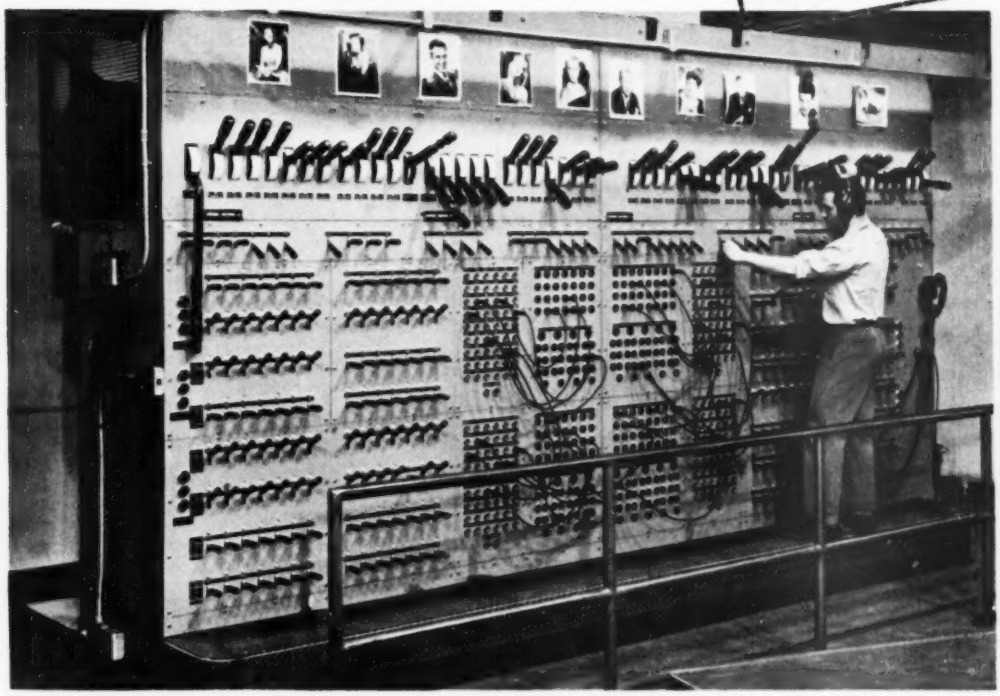
We can use all of this information and will appreciate it if you would supply us with 12 reprints of your editorials "Why We Must Sell Appliances", "Needed—Utility Leadership in Merchandising", "Sets Selling Sights High", and "Two to One—Merchandising Vs Non-Merchandising Power Companies".

Bernard E. Jaggers
New Business &
Merchandise Manager
Arkansas-Missouri Power Co
Blytheville, Arkansas

IT'S FEDERAL NOARK LIGHT CONTROL FOR

CBS *TELEVISION*

FEDERAL NOARK MEANS BUSINESS!



One of the new C. B. S. Switchboards . . . totally dead front for safe operation.

POPULAR SHOWS! Finest sets and costumes! Brilliant acting! You can have all these . . . but to put them across to the TV audience requires a stage lighting system of unlimited flexibility and velvet-smooth performance. To ensure this all-important lighting efficiency, Columbia Broadcasting System has installed Federal Noark Control Switchboards in its New York City studios.

Designed and built in one month

C. B. S. required switchboards with large capacity to permit pre-arrangement of lighting effects for a number of different sets. Each new switchboard, accordingly, controls 200 lighting circuits, any one or any group of which can be connected to any of 40 dimmers. All switches, of course, are of the silent-acting type . . . Important to C. B. S., Federal Noark designed and built these special switchboards within a month of receipt of order.

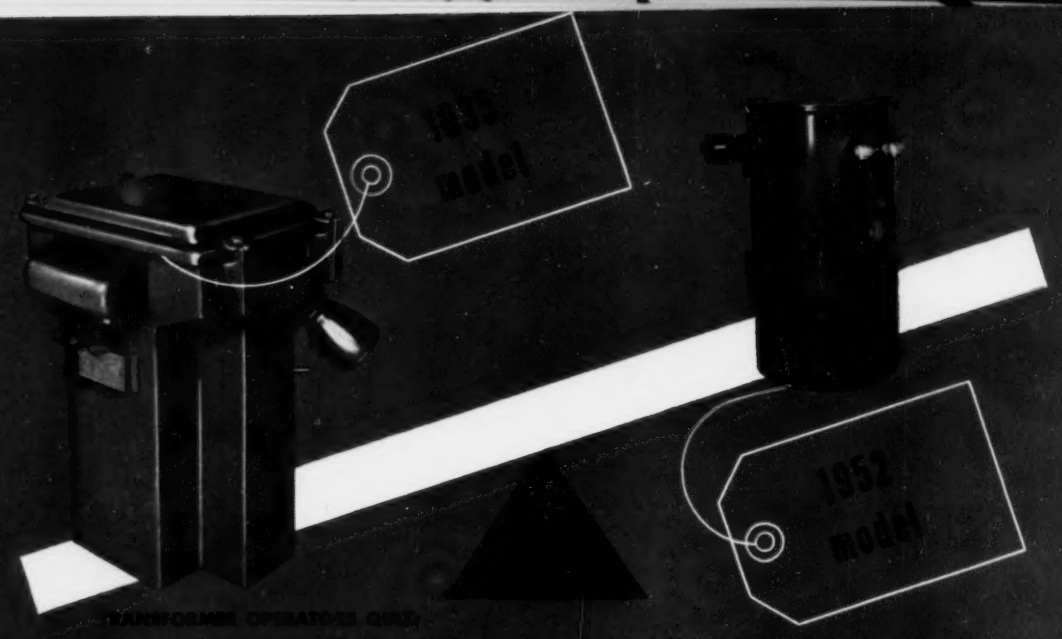
A full line of control equipment

For motion picture houses, theatres, clubs, auditoriums, schools, churches, recreation centers — wherever lighting effects must be regulated — Federal Noark switchboards and controls are tops. Likewise, throughout the whole range of electric control equipment, a host of unique developments has brought huge demands for Noark products. In a few short years, Federal Noark has become one of the largest designers and manufacturers in its field. Federal Electric Products Company, 50 Paris Street, Newark 5, N. J.

FEDERAL NOARK

Federal NOARK

Complete line of Federal Electric Products includes Motor Controls, Safety Switches, Service Equipment, Circuit Breakers, Panelboards, Switchboards, Control Centers, Bus Duct ★ Sales offices in principal cities.

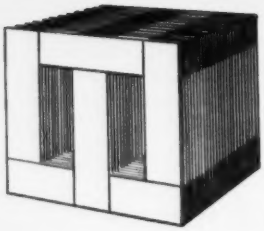


TRANSFORMER OPERATORS QUIZ:

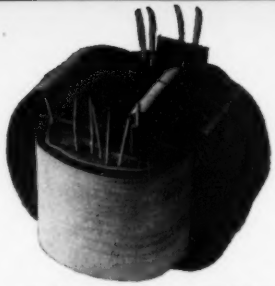
What did Kuhlman do in 1935 that made possible the smaller, lighter transformer of 1952?

Seventeen years ago Kuhlman introduced a revolutionary new more easily handled transformer core through a [illegible] design change which permitted [illegible] 1952! . . . This great saving in weight was made possible by the use of cold-rolled grain-oriented grain silicon steel in core construction. [illegible] Kuhlman was the first to use this steel in transformer cores, thereby making possible [illegible] a resultant weight saving of 25%. Although [illegible] overall improvement of transformers, [illegible] manufacturers have, by now, copied the design, [illegible] and clamp type bushings and [illegible] of the can thank Kuhlman for originating the [illegible] present day street lighting transformer.

The Kuhlman Bent Iron, first of the wound core designs.



This is the old, pre-1935 butt end transformer core, which had several joints of appreciable flux densities and in which much of the magnetic material was fluxed against the grain.



The first step toward a better design, with the magnetic material fluxed parallel to the grain, therefore reducing both circuit reluctance and exciting current and greatly improving space factor.

First of the wound core designs—the great Kuhlman Bent Iron Core! Note it has only one joint in each branch of magnetic circuit, reducing reluctance; more efficiently utilizes materials in their most desirable characteristics, thereby making a smaller, lighter transformer.

Kuhlman ELECTRIC COMPANY, BAY CITY, MICHIGAN K E

[illegible] name in transformers. Write for descriptive bulletins on Kuhlman power, distribution, dry type, sub-T-Kuhl and specialty units.

EXPORT REPRESENTATIVES: *Associated Standard Electric Corporation*
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